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A SYNOPSIS OF THE AMERICAN BETHYLIDAE
(HYMENOPTERA, ACULEATA)

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No. 1 — *A Synopsis of the American Bethyridae*
(Hymenoptera, Aculeata)

By Howard E. Evans

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INTRODUCTION

There are few major groups of Hymenoptera so poorly known, yet potentially so important from the standpoint of comparative structure and behavior, as the family Bethyridae (Aculeata, Bethyloidea). There has been no comprehensive review of the family since Kieffer treated the group in *Das Tierreich* in 1914 (as the Bethylinae). Kieffer's paper is, in fact, partially responsible for the neglect of the group since that time, for his keys and generic diagnoses have proved to be largely inadequate and sometimes based on erroneous descriptive bases. Furthermore, his types are widely scattered and mostly unavailable to all but the most persistent of workers. Kieffer recognized about 650 species in the world, placing these in about 100 genera. Some of his genera belong to other families, and many are synonyms, but there are enough genera with which he was unfamiliar to nearly make up the difference. Kieffer had studied a relatively small amount of material, especially from the New World, and it is probable that the actual number of species in the family is from five to ten times the number treated by Kieffer.

I do not mean to imply that no research has been done since Kieffer's time. Berland (1928) reviewed the species occurring in France, and Richards (1939) those occurring in England. Kurian has published several important papers on the Oriental

species (1954, 1955), and Benoit has recently been studying the very rich African fauna (1957, 1963, and papers in preparation). There have been numerous, mostly short papers treating the American species, the more active workers being Brues, Gahan, Muesebeck, Fouts, Ogloblin, and Evans. The lack of sound generic diagnoses and workable keys has provided a serious handicap. The present paper is primarily an attempt to clarify the genera and higher taxa occurring in the Americas and to list the species currently assigned to each. Species descriptions are included primarily in cases where they add to knowledge of the morphological scope of the genus or of its distribution; keys to species are included only in a few genera. I have described two new genera and placed several of Kieffer's generic names in synonymy. There will undoubtedly be many other changes made in the future in the generic classification of these wasps. When the Neotropical fauna has been better collected and more fully studied, and when the studies of Benoit on the African fauna have been completed, it may be possible to prepare a generic revision of the world fauna. In the meantime, I am hopeful that the present paper may provide a foundation for research on the bethylid fauna of the Western Hemisphere.

ACKNOWLEDGMENTS

Study of type specimens in the British Museum was made possible by a grant from the Permanent Science Fund of the American Academy of Arts and Sciences. I am indebted to the curators of several European museums for lending me the types of certain of Kieffer's species, and to Dr. R. L. Doutt, of the University of California at Albany, for making available many Kieffer types belonging to Pomona College, Claremont, Calif. The following is a list of institutions and individuals that have provided material for these studies, including the abbreviation by which each is referred to in the text.

- Academy of Natural Sciences of Philadelphia (ANSP)
- American Museum of Natural History, New York (AMNH)
- British Museum (Natural History), London (BMNH)
- Brasil: Secretaria da Agricultura, São Paulo (BSA)
- California Academy of Sciences, San Francisco (CAS)
- California Department of Agriculture, Sacramento (CDAS)
- California Insect Survey, Berkeley (CIS)
- Carnegie Museum, Pittsburgh, Pa. (CM)

Cornell University, Ithaca, New York (CU)
Escuela Nacional de Agricultura, Chapingo, Mexico (ENAC)
Hope Collections, Oxford University, England (HCOU)
H. K. Townes Collection, Ann Arbor, Mich. (HKT)
Illinois Natural History Survey, Urbana (INHS)
Kansas State University, Manhattan (KSU)
Kansas University, Lawrence (KU)
K. V. Krombein Collection, Arlington, Va. (KVK)
Museum of Comparative Zoology, Cambridge, Mass. (MCZ)
University of Arizona, Tucson (UA)
University of California, Davis (UCD)
United States National Museum, Washington (USNM)

BIOLOGY

Several brief surveys of the biology of the Bethyridae have been published (Wheeler, 1928; Nielsen, 1932; Clausen, 1940; Yamada, 1955), and the time does not seem ripe for a full-scale reconsideration of this subject. Under each of the genera treated in the present paper, I have presented a few notes on the life histories as well as references to the more significant sources of information. I am hopeful that this synopsis will stimulate workers to fill in some of the very many gaps in our knowledge of the life histories and behavior of these wasps. A few of the more significant general features are outlined in the following paragraphs.

The family Bethyridae apparently arose from some very primitive, long since extinct stock of Aculeata possessing 13-segmented antennae in both sexes. The bulk of the aculeate wasps evolved to exploit free-living hosts, originally of moderate to large size, later of small size (employing several to many per nest-cell). On the other hand, the Bethyridae evolved to exploit small larvae occurring in cryptic situations (such as the soil, stems, wood, or seeds). The Bethyridae have remained a family of small wasps (with minor exceptions, 1 to 10 mm long) exhibiting various adaptations for entering the habitats of their hosts (fossorial legs, depressed bodies, reduced wings, etc.). Some Bethyridae evolved to attack larger hosts, but the wasps remained small, subduing their hosts by repeated stinging and eventually laying several eggs on each host. The resulting multiple parasitism resembles that of some of the parasitoid Hymenoptera, but is quite unlike that of other Aculeata. Some of these gregarious

Bethylidae developed complex types of polymorphism, and some developed unique types of subsocial behavior. Many Bethylidae drag or carry their prey to a crevice, exhibiting types of prey carriage and nest closure paralleling those of some of the more typical Aculeata, but sometimes unique (for example, the dorsal prey carriage of some *Epyris* and *Cephalonomia*).

All in all, the Bethylidae display a fascinating diversity in their behavior and development. However, as Clausen has pointed out, they show an exceptional uniformity in their host preferences. The larvae (and occasionally pupae) of Coleoptera, particularly soil, wood, and seed-inhabiting types, provide the major hosts. Members of the subfamily Bethylinae, as well as a few Epyrinae, attack the larvae of Lepidoptera, again chiefly borers and seed-feeders, also case bearers and leaf rollers. There are a few instances of probable attack on hymenopterous larvae, but none of these have been definitely confirmed. Considering the rather limited host repertory of the family, it is surprising to learn that under experimental conditions some species of Bethylidae will attack and develop normally on insects of several different orders (see discussion under *Scleroderma*). Permanent paralysis of the host is usual, and development of the larva is external. Adult female Bethylidae usually feed on the body fluids of the host, and some are known to paralyze hosts specifically for feeding purposes and to take no other form of nourishment. However, adults of some genera (e.g., *Epyris*, *Anisepyrus*, *Goniozus*) also feed on carbohydrates, which they typically find in honeydew (rarely in flowers).

The family Bethylidae occupies a central position in the superfamily Bethyloidea. The family Chrysididae, with its several distinctive subfamilies, probably evolved directly from the Bethylidae, perhaps from an early stock of Mesitiinae. The Chrysididae (*sensu lato*) show considerable diversity in biology and attack such diverse insects as walking sticks, sawflies, and aculeate Hymenoptera. The Embolemidae and Dryinidae, which are predators on Homoptera, are more distantly related to the Bethylidae but may have shared a remote common ancestry with them. The Sclerogibbidae, which attack Embioptera, may also have shared a remote common ancestry with the Bethylidae. This entire superfamily provides a vast field for research in comparative structure and behavior.

PHYLOGENY

A detailed consideration of the phylogeny of the Bethyliidae is premature at this time, and the accompanying tree (Fig. 1) is no more than a very preliminary attempt to generalize regarding the probable relationships of the American genera. In this arrangement, it is assumed that the ancestral bethylid was tiphid-like, without strong sexual dimorphism, fully alate in both sexes and with at least six closed cells in the fore wing, with 13-segmented antennae, 6-segmented maxillary palpi, 3-segmented labial palpi, and a fully developed metanotum. This ancestor was moderately large (for a bethylid) and a single larva developed on each host. Ascent from this generalized form involved the reduction in body size and in development of various

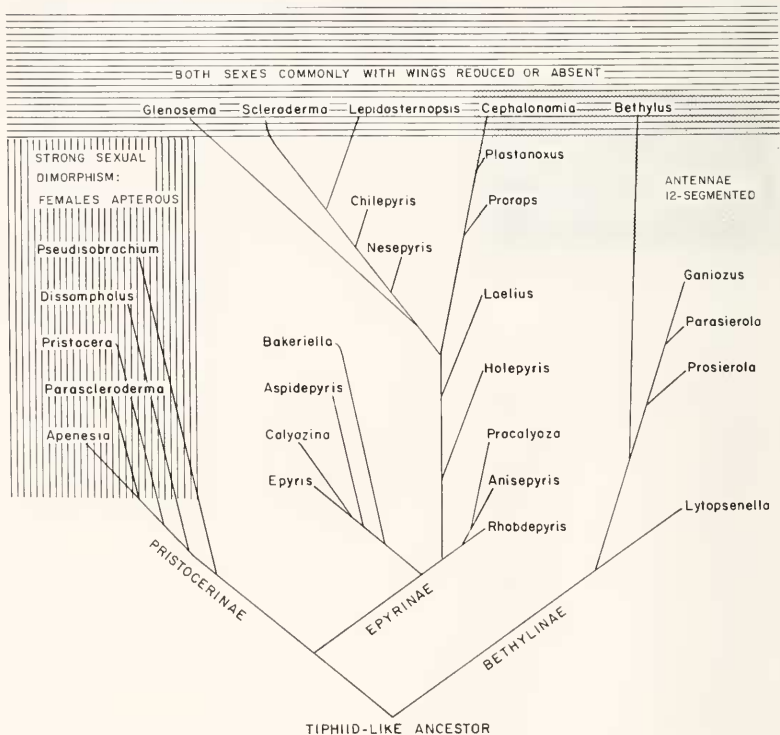


FIG. 1. Dendrogram showing possible relationships of the subfamilies and genera of Bethyliidae occurring in the Americas.

body structures, including antennal and palpal segmentation, eyes, ocelli, occipital carina, notauli, metanotum, and, of course, reduction in wing venation as well as in wing size, the wings and tegulae being wholly lost in all female *Pristocerinae* and in both sexes of a few specialized *Epyrinae*. Also involved was the acquisition of certain specializations such as the tergal pits of *Dissomphalus*, the pectinate antennae of *Calyozina* and *Procalyoza*, modifications of the pronotum in *Aspidepyris*, *Bakeriella*, and *Aniscepyris*, the bilobed condition of the parameres of the male genitalia in several genera, etc. The more advanced Bethylidae developed more elaborate behavior patterns, including the subduing of large hosts by repeated stinging, laying of several eggs on a single host, maternal care of eggs and larvae, etc. For further documentation of this phylogenetic arrangement, the reader is referred to the discussions of structure and biology under each of the genera.

STRUCTURE AND TERMINOLOGY

Bethylid wasps have a characteristic facies and with a little experience can be separated at a glance from other Hymenoptera. They can be defined as small, elongate, often depressed Aculeata, with the head usually elongate and somewhat prognathous, possessing antennae with either twelve or thirteen segments in both sexes, a pronotum which reaches the tegulae, relatively short legs which are generally non-spinose (except often the middle tibiae), wings sometimes reduced or absent, when present with reduced venation, fore wings without closed submarginal cells (rarely with one) and not more than one closed discoidal cell, hind wings without closed cells but with an anal lobe, abdomen with seven or eight visible segments.

Head.—The maxillary palpi have a maximum of six segments, the labial palpi a maximum of three; the segmentation of the palpi is of some importance, but often difficult to determine with certainty without dissection and study under high magnification. The mandibles have several apical teeth which are numbered from 1 to 5 (rarely to 7) starting with the outermost tooth. The clypeus is of much importance in classification although sometimes partially covered by the base of the antennae and hence difficult to study. Head shape and the size and position of the eyes and ocelli are of much importance and the following standard measurements and abbreviations are used for expressing these factors (see Fig. 2):

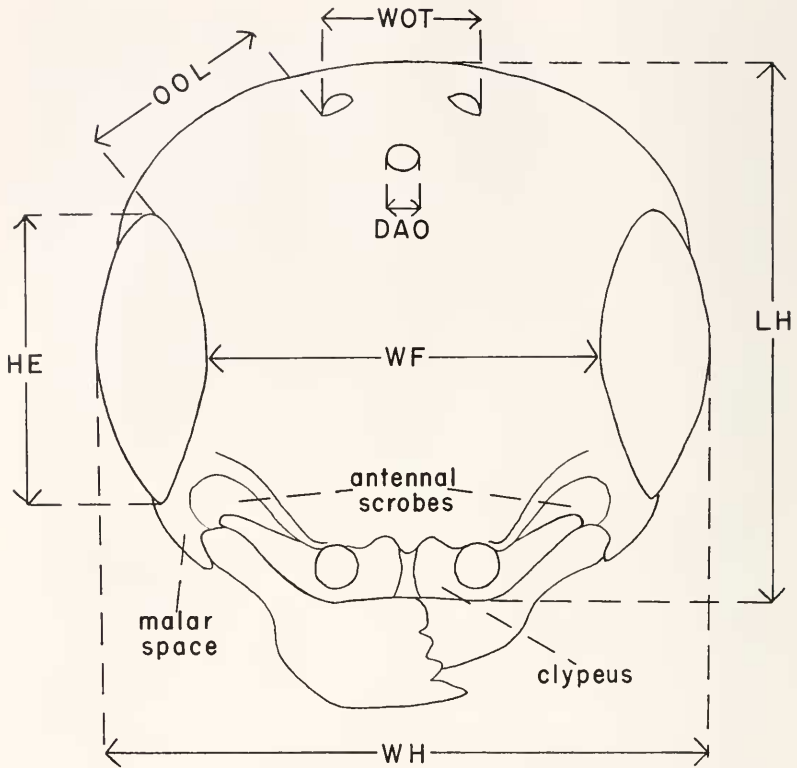


FIG. 2. Head of *Rhabdopyris megacephalus* (Ashmead), female, showing major structures and standard measurements. DAO: diameter of anterior ocellus; HE: height of eye; LH: length of head; OOL: ocello-ocular line; WF: (minimum) width of front; WH (maximum) width of head (including eyes); WOT: width of ocellar triangle.

Length of head (LH): measured from median apical margin of clypeus to median point of vertex, expressed in millimeters and/or as a ratio with width of head.

Width of head (WH): maximum width, including eyes, usually expressed as a ratio with length of head and/or maximum width of thorax.

Width of front (WF): minimum width, i.e., at the point of closest approximation of the eyes.

Height of eye (HE): maximum height (or length) of eye as measured in lateral view.

Diameter of anterior ocellus (DAO): measured as an indication of ocellar size, expressed as a fraction of WF.

Width of ocellar triangle (WOT): distance across and including lateral (posterior) ocelli.

Ocellus-ocular line (OOL): shortest distance from a lateral ocellus to nearest eye margin.

Distance from eye tops to vertex crest: measured in lateral view (difficult to measure accurately and hence should be considered an approximation).

Angle of ocellar triangle: measured by superimposing a right angle of a grid micrometer over the outer sides of the anterior and one lateral ocellus and determining whether the angle of the line extending to the other lateral ocellus is greater or less than a right angle.

Antennal measurements: the length/maximum width for antennal segments three (sometimes four) and eleven are measured, as an indication of flagellar length.

Thorax. — The term thorax is used to mean the alitrunk or mesosoma (morphological thorax + propodeum). The pronotum consists of an anterior collar, projecting into the foramen of the head and usually on a lower plane than the disc, which is the dorsal portion of the main part of the pronotum. The mesoscutum may have two sets of furrows, the more lateral parasidal furrows and the more median notauli; the scutellum has a central, elevated disc which may have a transverse groove or a pair of pits at its base. The shape and sculpturing of the propodeum are of much use in classification, and several special terms are employed to designate the measurements and carinae involved (see below and Fig. 3). The mesopleura may be simple or strongly sculptured; in certain genera there is a sharply defined, depressed area near the top, called the upper fovea, and a larger one below, called the lower fovea. The following are the standard measurements and special terms employed for the thorax:

Length of thorax (LT): measured in lateral view from the pronotum (excluding the collar) to the apex of the propodeum.

Length of fore wing (LFW): measured as a more accurate indication of size (in fully winged forms) than body length, since the latter is much influenced by the position of the head and the amount of extension of the abdomen.

Length of propodeum: measured in full dorsal view including declivity and including the projections which embrace the sides of the mesonotum (in females in which these are present).

Length of propodeal disc: along midline but exclusive of declivity.

Width of propodeal disc: maximum in full dorsal view.

Discal carinae: the major longitudinal carinae of the propodeal disc, including median but excluding sublateral and lateral carinae.

Transverse carina: the transverse carina margining the propodeal disc behind (i.e., separating it from the declivity).

Lateral carinae: the longitudinal carinae along the sides of the propodeal disc.

Sublateral carinae: the longitudinal carinae closely paralleling the lateral carinae and located just mesad of them.

Propodeal formula: in wingless females, the width of the propodeum anterior to the constriction as compared to the width at the constriction and as compared to the greatest width posterior to the constriction.

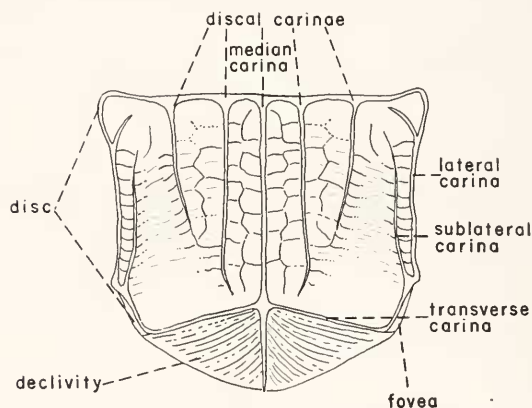


FIG. 3. Propodeum of *Anisepyris bridwelli* (Evans), female, with major features labeled.

Wing venation.—The terminology employed for the wing veins and cells is the one employed by Kieffer and others who have worked on this group. The veins and cells present in *Pristocera* are labeled on Figure 4, where this system is compared with

the modified Comstock-Needham terminology with respect to the major veins. On the outer part of the fore wing in most bethylids there are several hyaline streaks which presumably mark the course of former veins; these are indicated on the figures as stippled lines. These hyaline streaks are not presently used in classification, but they appear to be quite constant in various complexes of genera and species, and it is probable that they will some day be utilized.

Although *Pristocera* possesses a reasonably complete venation for a bethylid, there are certain features not present in that genus which require explanation. In some genera the subcosta is so greatly thickened apically, just before the stigma, as to simulate a second stigma; this is called a prostigma (see Figs. 99, 101, 135, and 139). In *Pristocera* the cubitus (i.e., M in the modified Comstock-Needham system) is incomplete basally, but the base of this vein is typically preserved in the subfamily Bethylinae, where it appears as a short vein arising from the basal vein (Fig. 139). In some genera of Bethylinae this vein actually encloses a small cell or areola which is equivalent to the first discoidal cell of most Aculeata (Fig. 129). The so-called discoidal cell of *Pristocera* and other Bethylidae is actually the second discoidal cell. Closed marginal and submarginal cells are present only in certain Bethylinae (Fig. 125); in the Pristocerinae and Epyrinae these cells are open or indistinctly closed.

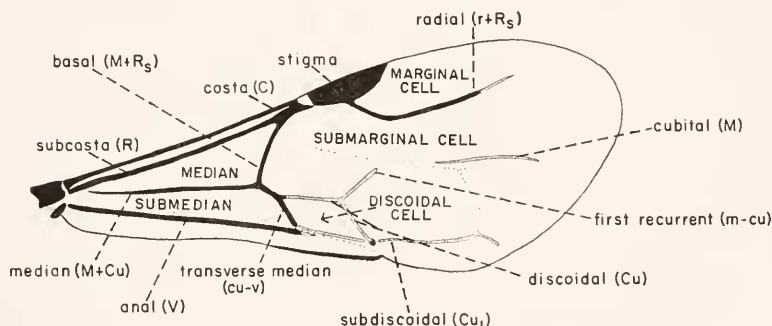


FIG. 4. Fore wing of *Pristocera armifera* (Say), male, with major veins and cells labeled. Following the name of each vein is indicated, in parenthesis, the standard abbreviation for the name of that vein according to the Comstock-Needham system as modified by H. H. Ross. The stippled lines signify hyaline streaks in the wing membrane.

Abdomen.—The term abdomen is used to mean the gaster or metasoma (morphological abdomen minus the propodeum); thus “tergite 2” should be taken to mean the true third abdominal tergite. The abdomen is said to be petiolate if the first tergite does not attain the extreme base of the first segment; it is said to be sessile if the first tergite does reach the base, even if it is rather slender. The apical sternite of the male is called the subgenital plate. The genitalia (Fig. 5) are described according to the terminology employed by Snodgrass (1941) except with respect to one feature. According to Snodgrass the position of the two apical lobes of the volsella is reversed in *Pristocera* (and presumably in other Bethyloidea). However, Ogloblin (1960) found that in *Perisierola* (i.e., *Parasierola*) the digitus and cuspis are in their normal position. I have examined the genitalia of all genera occurring in the Americas, and I am convinced that all Bethylidae are alike with respect to the position of the volsellar structures. I have not studied the musculature, but I find it difficult to agree with Snodgrass that the immovable lobe (by definition the cuspis) is mesal in position; in all Bethylidae (including *Pristocera*) the mesal lobes appear to articulate with the volsellar bases while the lateral lobes seem rigidly attached to them. Although I have followed Snodgrass in all my papers up to this date (including my revisions of *Pristocera*, *Apenesia*, *Pseudisobrachium*, *Dissomphalus*, and *Anisepyris*), I regrettably find it necessary to reverse my terminology in favor of that employed by Ogloblin.

In some genera of Bethylidae the genitalia are very complex and special terms have had to be coined to describe certain structures. Both the parameres and the cuspides may be deeply divided into paired structures, which in each case are termed the dorsal and ventral lobes or arms. The volsellae, in one genus, possess a median basal portion bearing radiating lines, termed a vannus (see Fig. 59). The aedoeagus may be simple or complex; when it is complex it is convenient to distinguish between ventral, middle, and dorsal lobes, valves, or rami (in order of decreasing width, the last named being very slender). In some genera (most particularly *Dissomphalus*) the aedoeagus is so complex as to defy accurate description or illustration. Unless otherwise stated, all figures of the genitalia show the ventral aspect.

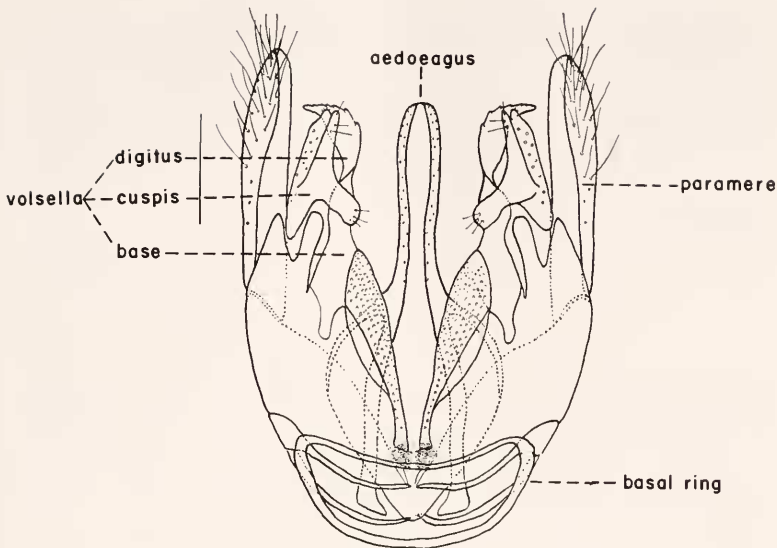


FIG. 5. Male genitalia of *Rhabdepyris megacephalus* (Ashmead), ventral aspect, with major structures labeled.

TAXONOMY

Although I have found much revision necessary on the generic level, on the whole Kieffer's (1914) suprageneric taxa appear valid, at least when one moves certain genera into more appropriate positions and eliminates others altogether. Kieffer recognized five tribes of Bethylinae (= Bethylidae in the modern sense): Sclerodermini, Mesitiini, Epyrini, Pristocerini, and Bethylini. With one exception, these groups (with somewhat altered content) deserve to be considered subfamilies. The one exception is the Sclerodermini, which appears to me to be connected with the Epyrini by a series of intermediate genera (e.g., *Laelius*, *Plastanoxus*, *Nesepyrus*). I have therefore placed the Sclerodermini in the subfamily Epyrinae as one of three tribes, the other two being the Cephalonomiini and the Epyrini. One subfamily, the Mesitiinae, does not occur in the Americas and is therefore excluded from further consideration here. As indicated further below, Brues' *Mesitius neotropicus* is not a true *Mesitius*, and all the other genera included by Kieffer in the Mesitiinae belong elsewhere than in the Bethylidae.

Before proceeding further, it seems desirable to eliminate those genera which either are not Bethyilidae or which are unrecognizable and likely to remain so. Although the following listing of these genera pertains chiefly to the American fauna, I have included a number of Old World genera which clearly are not bethyilids. I have also appended a list of American species which have been treated as bethyilids but which do not belong to this family or which are unrecognizable.

List of genera and species not belonging
to the Bethyilidae or unrecognizable

Genera transferred to the Tiphhiidae

Bruesiella Mann, 1914. The type specimen of the only known species, *formicaria* Mann, from Mexico, is in the MCZ. It is clearly a tiphhiid of the subfamily Brachycistidinae, and Dr. Karl V. Krombein, who has examined the type, informs me that *Bruesiella* is to be considered a senior synonym of *Euryeros* Mickel and Krombein.

Dryinopsis Brues, 1910. The type specimen of the only known species of this genus (*simplicipes* Brues, from Borneo) is also in the MCZ. As Reid (1941) has indicated, from a study of Brues' description and figure (Brues, 1910a), this insect is clearly not a dryinid or a bethyilid, although Kieffer placed it in the Sclerodermini. *Dryinopsis* is best considered a subgenus of the tiphhiid genus *Methocha* (K. V. Krombein, *in litt.*).

Genera transferred to the Rhopalosomatidae

Saphobethylus Kieffer, 1911. Turner and Waterston (1917) placed this genus in the synonymy of *Olixon*, in the Rhopalosomatidae. I have examined the type of the only known species, *pallidus* Kieffer, from Mexico, in the BMNH, and can confirm this synonymy.

Algoella Kieffer, 1914 (= *Algoa* Brues, 1910a, *nec* Castelnau, 1861). This genus appears to be allied to *Olixon*, as indicated by Brues (1922); it was described from South Africa, and included by Kieffer in the Sclerodermini.

Harpagocryptus Perkins, 1908. This Australian genus, although included by Kieffer in the Mesitini, is clearly a relative of *Olixon* (Brues, 1922; Reid, 1941).

Genera transferred to the Chrysididae

Godfrinia Kieffer, 1911. This genus, described from Mexico, has been transferred by Reid (1941) to the Chrysididae. I

have studied Kieffer's material in the BMNH and can confirm this placement. The genus falls in the Cleptinae and I presume is to be considered a junior synonym of *Cleptidea* Mocsáry, as suggested by Krombein (1957).

Promesitius Kieffer, 1905a. Reid (1941) transferred this Australian genus to the Chrysididae, and Krombein (1957) has placed it in the synonymy of the amisegine genus *Myrmecomimesis* Dalla Torre. Krombein also treats the Philippine genera *Cladobethylus* Kieffer, 1922 and *Rohweria* Fouts, 1925 as Amiseginae.

Genera transferred to the Loboscelidiidae

Laccomerista Cameron, 1910. This genus was described by Cameron from a specimen from Borneo. I have examined this specimen in the BMNH, and find it to be a species of *Loboscelidia*, a genus recently made the basis of a new family by Maa and Yoshimoto (1961). I consider *Laccomerista* a synonym of *Loboscelidia* (new synonymy).

Genera transferred to the Scolebythidae

Clystopsenella Kieffer, 1911. I have recently transferred this genus, described from Brazil, to the new family Scolebythidae (Scolioidea) (Evans, 1963a). The genus *Neoclystopsenella* of Kurian, 1955, described from India, is not at all related to *Clystopsenella*; I am unable to place it but question whether it is a bethylid.

Genera which cannot be recognized

Omaloderus Walker, 1843 (= *Homaloderus* Dalla Torre, 1898).

This genus was described from a specimen collected by Charles Darwin at Coquimbo, Chile. Kieffer listed the genus as unrecognizable, as it still remains. The antennae are said to have 14 segments, which if true would eliminate the genus from the Bethylidae. Walker's type is apparently no longer extant.

Xestobethylus Cameron, 1909. This genus was based on *X. pallidipes* Cameron, from Argentina. Cameron's type does not appear to be present in the BMNH, and I am unable to recognize the genus from the description. Kieffer (1914) treated it as a subgenus of *Rhabdepyris*, but this seems a very arbitrary and probably erroneous disposition of the name.

*American species assigned to the Bethylidae
but belonging elsewhere*

- formicaria* Mann, 1914, p. 182; ♀, Mexico (*Bruesiella*, here transferred to the Tiphiiidae as a synonym of *Euryeros*).
- longiventris* Kieffer, 1911, p. 204; ♀, Brazil (*Clystospencella*, transferred to the Scolebythidae by Evans, 1963a).
- neotropicus* Brues, 1914, p. 119; ♂, British Guiana (*Mesitius*, but properly belonging in the chrysidid genus *Cleptidea*, based on examination of type in MCZ).
- negrocincta* Kieffer, 1911, p. 207; ♂, Mexico (*Godfrinia*, here transferred to the Chrysididae, Cleptinae).
- pallidus* Kieffer, 1911, p. 216; ♂, Mexico (*Saphobethylus*, now regarded as a synonym of *Olixon* in the Rhopalosomatidae).
- scutellaris* Cameron, 1897, p. 275; ♂, Mexico (*Eypris*, omitted by Kieffer, 1914, here reassigned to *Cleptidea* in the Chrysididae on basis of type examination in BMNH).
- viridiceps* Kieffer, 1911, p. 206; ♀, Mexico (*Godfrinia*, here transferred to the Chrysididae, Cleptinae).

American species which cannot be recognized

- intrepidus* Walker, 1843, p. 188; (sex?), Chile (*Omaloderus*).
- musculus* Say, 1836, p. 280; (sex?), Indiana (*Bethylus*, placed in *Plastanoxus* by Kieffer but best treated as unrecognizable, following Muesebeck and Walkley, 1951).
- pallidipes* Cameron, 1909, p. 450; ♀, Argentina (*Xestobethylus*).

KEY TO SUBFAMILIES OF AMERICAN BETHYLIDAE

1. Wings (when fully developed) with a vein, or at least the stub of a vein, arising from the basal vein (Figs. 125, 139, 142); clypeus medially with a carina or at least a polished area which continues up the front well above the antennal bases as a median polished streak or carina (Figs. 130, 136, 140); claws very strongly curved, deeply bifid (Figs. 127, 128, 133, 134) III. BETHYLINAE, p. 180
- Wings (when fully developed) with the basal vein simple (or absent), not giving rise to a vein or stub (Figs. 6, 63, 99); clypeus variable, only occasionally (and chiefly in fully winged forms) with its median area continuous with a polished streak or carina on the lower front; claws variable, rarely exactly as above (Figs. 66, 87, 119) 2

2. Males with the metanotum well developed, fairly broad, medio-anteriorly with an emargination or fovea opposite apex of scutellum, scutellum and propodeum not nearly in contact medially (Figs. 8, 14, 20, 40); females always completely apterous, with the eyes small to absent (eye height at most .25 X head width), ocelli absent, antennal scapes flattened to a thin flange at base (Figs. 9, 15, 16, 21, 41)

I. PRISTOCERINAE, p. 19

- Males (also females) with the metanotum much reduced, the scutellum in contact with the propodeum medially or nearly so, or if slightly separated the metanotum not emarginate or foveolate medially (Figs. 64, 70, 75, 106); females alate, brachypterous, or apterous, if apterous not entirely as above (eye height more than .25 X head width, e.g., Figs. 109, 115, 121)

II. EYPRINAE, p. 89

I. SUBFAMILY PRISTOCERINAE

Subfamilial characters. — *Males.* Antennae with thirteen segments, the flagellar pubescence semi-erect to erect, or if subappressed then with erect setae present; maxillary palpi with five or six segments, labial with three; median elevation of clypeus not extending up the lower front as a polished ridge. Mesoseutum moderately long, not greatly reduced by an elongated pronotum; metanotum well developed, fairly wide, more or less emarginate or with a strong fovea medio-anteriorly, against the posterior end of the scutellum, the scutellum and propodeum thus well separated; propodeum with or without a transverse carina margining the disc behind, never with the posterolateral corners foveolate. Fore wing with costal, subcostal, and submedian cells present, stigma strong, radial vein present and long, discoidal vein almost always indicated at least by a weak line, discoidal cell frequently outlined; cubitus absent or sometimes faintly indicated on outer part of wing, but basal vein not giving rise to another vein. *Females.* Completely without wings or tegulae, often pale in color and with swollen femora and somewhat fossorial legs. Palpi with the usual number of segments or both pairs much reduced; antennae 13-segmented, scape rather large, flattened to a thin flange at base and arising from distinct tubercles, eyes small, often very small or even absent, at the maximum eye height about .25 X head width. Mesopleura often (but not always) strongly developed, with a dorsal surface; propodeum usually at least weakly constricted near the spiracles, often strongly constricted either at the spiracles or at the extreme anterior margin; middle tibiae with or without spines above.

Included genera. — Kieffer (1914) included 14 genera in this group, which he gave the status of a tribe. Several of his genera are synonyms, but certain genera which properly belong here were placed in other tribes (*Kathepyris*, *Usakosia*, *Prosapenesia*, *Apenesia*, *Lyssepyris*, *Xanthepyrus*, *Acrepyris*, *Parisobrachium*, the last four names being synonyms of various genera of Pristocerinae). Benoit (1957) has recently described several new genera and subgenera from Africa. Altogether over 25 generic names are available for members of this complex. However, I find only five of these necessary to encompass the Nearctic and Neotropical species. Even with the use of only five names, one finds species which come close to bridging the gaps between the genera.

The material I have seen from other parts of the world can for the most part be placed in these same five genera. The Ethiopian region provides the major exceptions; this region is especially rich in Pristocerinae and presents a bewildering array of forms, many known from only one sex. Some of the names which have been proposed for African forms will doubtless hold for valid genera or at least subgenera (e.g., *Prosapenesia* Kieffer, *Dicrogenium* Stadelmann, *Neodicrogenium* Benoit), but most of the others seem to me of questionable status, tying in closely with one or another of the genera here recognized for the Americas (e.g., *Diepyris* Benoit, *Afrisobrachium* Benoit). Some of the African forms seem unusually primitive in body form and in wing venation, and a careful study of the Ethiopian fauna might do much to clarify not only the world fauna of Pristocerinae, but also the relationships of the Bethyridae to other families of Hymenoptera.

KEY TO GENERA OF PRISTOCERINAE

1. Completely apterous; ocelli absent (females) 2
Fully winged; ocelli present (males) 6
2. Propodeum strongly constricted at its extreme anterior end, where it forms a pair of small processes which embrace the tip of the elongate mesonotum (Fig. 41); each eye consisting of a single facet, or eyes absent 5. PSEUDISOBRACHIUM Kieffer, p. 62
Propodeum not reduced to a pair of small processes anteriorly, broadly in contact with the mesonotum, constricted at or near spiracles if at all (Figs. 9, 15, 21); each eye consisting of more than one facet (some exceptions) 3
3. Mesopleura, seen in dorsal view, very small, thorax barely wider across mesothorax than across prothorax (Fig. 21); propodeum more or less parallel-sided, at most weakly constricted; palpi very short, maxillary

- palpi with at most two segments (Fig. 22); abdomen petiolate.
4. DISSOMPHALUS Ashmead, p. 41
 Mesopleura, seen in dorsal view, quite large, thorax distinctly wider across mesothorax than elsewhere (Figs. 9, 15); propodeum with a more or less evident constriction at or near the spiracles (rarely nearly parallel-sided); maxillary palpi longer, with at least three segments; abdomen sessile or petiolate 4
4. Propodeal constriction strong, maximum width of propodeum at least twice the width at the constriction (Fig. 9); maxillary palpi with six segments (Fig. 11) 1. PRISTOCERA Klug, p. 22
 Propodeal constriction weak to moderate, maximum width of propodeum rarely up to 1.9 X width at constriction (Fig. 15); maxillary palpi with three or four segments (Figs. 13, 17) 5
5. Middle tibiae spinose above; thorax, seen from above, without a strong constriction between the prothorax and mesothorax, the propodeal constriction weak to moderate (Fig. 15); maxillary palpi with four segments (Fig. 13) 2. APENESIA Westwood, p. 29
 Middle tibiae smooth above; thorax, seen from above, with a distinct constriction between the prothorax and mesothorax; propodeal constriction weak (Fig. 16); maxillary palpi with three segments (Fig. 17); body strongly flattened; antennae relatively long, filiform.....
 3. PARASCLERODERMA Kieffer, p. 38
6. Second abdominal tergite with one or two pairs of pale spots, depressions, pits, tubercles, or other modifications (Fig. 20); clypeus large, well developed in front of antennal sockets, medially with from one to three teeth (Figs. 24-28); maxillary palpi with five segments (Fig. 23) 4. DISSOMPHALUS Ashmead, p. 41
 Second abdominal tergite simple, without modifications; clypeus with a variously developed median lobe on each side of which (directly in front of the antennal sockets) it is much shortened (except in a very few species); maxillary palpi with six segments (rarely only five) (Fig. 10) 7
7. Clypeus with a strongly projecting, somewhat trapezoidal median lobe which is usually truncate, occasionally bidentate or with a median tooth (median lobe angulate in two known species) (Figs. 40, 44-54); eyes rather densely and uniformly covered with short hairs (rarely glabrous); subgenital plate with three short basal stalks (Figs. 56, 57, 60, 61); genitalia with the parameres deeply divided into two lobes (Figs. 55, 58, 59, 62)
 5. PSEUDISOBRACHIUM Kieffer, p. 62
 Median lobe of clypeus truncate, angulate, or rounded, never trapezoidal; eyes glabrous, or with a band of short or rather long hairs above (uniformly sparsely short-haired in a very few species of *Apenesia*); subgenital plate with a long median basal stalk (Figs. 7, 19); genitalia with parameres not deeply divided 8

8. Propodeum with basal triangle marked off by a shallow depression and/or a carina, disc behind triangle with prominent sculpturing; median lobe of clypeus short, truncate or emarginate; fore wing with costa barely developed beyond stigma, at least not longer than stigma (Fig. 6); claws with a basal swelling as well as two outer rays, thus somewhat tridentate or trifid; cuspides of genitalia in the form of simple curved rods 1. PRISTOCERA Klug, p. 22
- Propodeum with basal triangle not set off as above, often poorly defined, remainder of disc weakly or not at all sculptured; median lobe of clypeus truncate or angularly or roundly projecting; fore wing costa extending as a distinct vein far beyond stigma (Fig. 12) (except in a few species having the clypeus angularly produced medially); claws dentate, usually without a well-formed basal tooth as above; cuspides divided into dorsal and ventral arms, the latter strongly setose (a few exceptions) .. 2. APENESIA Westwood, p. 29

1. Genus PRISTOCERA Klug

Pristocera Klug, 1808, p. 49 (type species *Bethylus depressus* Fabricius, monobasic). —Klug, 1810, pp. 202-206. —Ashmead, 1893, p. 32. —Ashmead, 1902, p. 270. —Kieffer, 1905b, pp. 287-288. —Kieffer, 1906a, pp. 289-294. —Kieffer, 1908a, pp. 21-22. —Kieffer, 1914, pp. 453-470 (spp. of world). —Yasumatsu, 1955, pp. 233-249 (Japanese spp.). —Benoit, 1957, pp. 46-55 (Central African spp.). —Benoit, 1963, pp. 32-95.

Mangesia Kieffer, 1911, pp. 209-211 (type species *M. fuscipennis* Kieffer [= *subviolacea* Enderlein], original designation; synonymy by Benoit, 1963). —Kieffer, 1914, pp. 452-453.

Trichelobrachium Kieffer, 1914, p. 425 (type species *Pristocera oblitterata* Kieffer, monobasic; synonymy by Benoit, 1963).

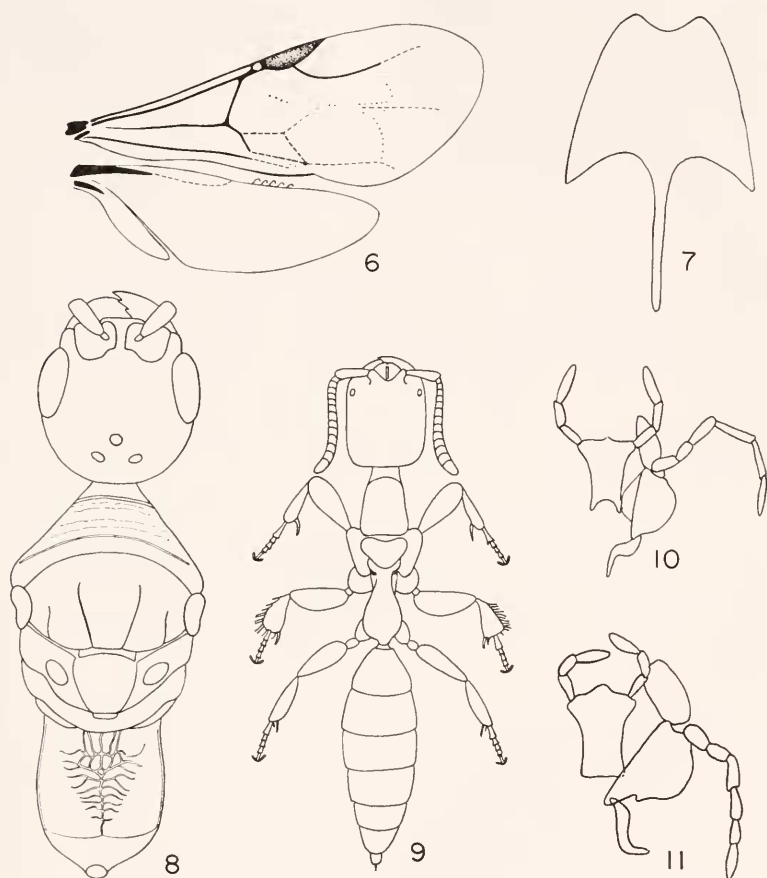
Subgenus ACREPYRIS Kieffer

Acrepyris Kieffer, 1905b, p. 249 (type species *Epyris reticulatus* Kieffer [= *Pristocera armifera* (Say)], monobasic). —Kieffer, 1908a, pp. 33-34. —Kieffer, 1914, p. 418. —Evans, 1963b, pp. 241-290 (revision of American spp.).

Neopristocera Yasumatsu, 1955, p. 248 (type species *Pristocera japonica* Yasumatsu, original designation; synonymy by Evans, 1963b).

Generic and subgeneric characters. — *Males.* Maxillary palpi with six segments, labial palpi with three. Mandibles broad apically, with four or five large teeth; clypeus with the median lobe broad and short, truncate or emarginate apically; eyes glabrous or with short or fairly long hairs in a band on the upper part; antennae elongate, 13-segmented, filiform, submoniliform, or weakly serrate, flagellum densely clothed with erect or

suberect setae which may be short or long, one species with erect setae which stand out above the pubescence; ocelli not enlarged; occipital carina complete. Pronotum with a transverse impression at or paralleling the posterior margin; mesoseutum with the notauli complete or nearly so; scutellum with a strong basal groove; propodeum short, disc with or without a transverse carina behind, always with a basal triangular area which is set off by a carina or a shallow depression, disc behind the triangle more or less covered with sculpturing; claws with a broad, blunt basal



Pristocera armifera (Say). Fig. 6. Wings of male. Fig. 7. Subgenital plate of male. Fig. 8. Head and thorax of male. Fig. 9. Female. Fig. 10. Labium and maxilla of male. Fig. 11. Labium and maxilla of female.

tooth and two additional teeth, middle tooth short or long, erect or sloping. Fore wing with costa not extending beyond stigma to any appreciable extent; basal vein reaching subcosta a short distance basad of stigma; transverse median vein oblique; discoidal vein at least weakly indicated, often quite strong, most species with the discoidal cell fully outlined and the subdiscoidal vein extending nearly to outer wing margin. Abdomen sessile, relatively broad and short. Subgenital plate simple, with a long median basal stalk. Genitalia broad; parameres short, variously lobed but never deeply divided; cuspides in the form of simple curved rods, not divided or setose; vannus absent; aedeagus complex, consisting of a pair of simple, short ventral valves, a pair of usually somewhat longer middle valves, and a pair of large dorsal valves which are variously lobed apically.

Females. Maxillary palpi with six segments, labial with three. Mandibles with four teeth in all known species; clypeus carinate medially, apical margin truncate or somewhat rounded or subangulate; eyes small or of moderate size, with from about 15 to more than 50 facets each; head longer than wide; antennae of moderate length, slender or somewhat incrassate. Mesonotum subtriangular, narrowly rounded behind, its posterior third embraced by the projecting anterior angles of the propodeum; propodeum strongly constricted just behind the spiracles, then expanded again posteriorly, its maximum width at least twice its minimum width; mesopleura prominent dorsally; middle tibiae strongly spinose. Abdomen sessile. (Figs. 6-11.)

Remarks. — As I pointed out in my recent revision of this group, all of the American species are assignable to the subgenus *Acrepyris*. The nominate subgenus contains numerous species in the Ethiopian region and several in the Palaearctic and Oriental regions. The females of the two subgenera cannot presently be separated.

Biology. — These insects attack wireworms (Elateridae), a single parasite larva developing at the expense of one or two host larvae. The Nearctic species *armifera* has been reared from wireworms of the genera *Limonius* and *Acolus* (Hyslop, 1916; Hayes, 1927). Two Japanese species have also been reared from elaterid larvae. Presumably the females enter the ground to seek their hosts. Males of the genus are most commonly taken in sweepings from grass or low vegetation, especially in sandy areas. The males apparently carry the females in flight during copulation. Further details are provided by Evans (1963b).

Distribution. — The subgenus *Acrepyris* is known to occur in the Old World only in eastern Asia, including the Philippines and Java. In this hemisphere, species of this group occur throughout temperate and tropical North and Central America, but no species are known from the West Indies or from South America. Twenty-one American species are currently recognized; eight of these occur in the United States and extreme northern Mexico, thirteen in central and southern Mexico and in Central America.

Included American species:

United States and northern Mexico

armifera (Say), 1828, p. 80; ♂, Indiana (widely distributed in eastern North America) (synonyms: *thoracica* Westwood 1839, *contracta* Westwood 1839, *laeviventris* Cresson 1872, *reticulatus* Kieffer 1904a) (♀ also known).

atra Klug, 1810, p. 206; ♂, Georgia (Florida to Carolinas, west to New Mexico) (♀ described by Evans, 1963b).

bridwelli Evans, 1963b, p. 267; ♂, Arkansas (♀ also described).

californica Evans, 1963b, p. 263; ♂, California (also Utah, Wyoming).

chihuahua Evans, 1963b, p. 284; ♂, Chihuahua, Mexico (also Arizona).

cockerelli Evans, 1963b, p. 264; ♂, New Mexico (also Texas, Arizona, Mexico) (♀ also described).

fraterna Evans, 1963b, p. 261; ♂, North Carolina (also South Carolina, Florida, Kansas) (♀ also described).

hyalina Brues, 1906, p. 143; ♂, Texas (Louisiana to New Mexico, south to central Mexico).

Central Mexico to Panama

erythropoda (Cameron), 1888a, p. 450; ♂, Panama (also Costa Rica).

intermedia Evans, 1963b, p. 278; ♂, San Luis Potosi, Mexico.

nebulosa Evans, 1963b, p. 281; ♂, Guatemala.

oriplana Kieffer, 1911, p. 215; ♂, Guerrero, Mexico.

orizabae (Cameron), 1897, p. 273; ♂, Veracruz, Mexico.

- otomi* Evans, 1963b, p. 268; ♂, state of Mexico, Mexico.
palliditarsis (Cameron), 1897, p. 274; ♂, Tabasco, Mexico
 (also Panama).
porteri Evans, n. sp. described below from ♂, British
 Honduras (sp. 2).
quiroga Evans, n. sp. described below from ♂, Michoa-
 can, Mexico (sp. 1).
rugifrons (Cameron), 1888a, p. 449; ♂, Guatemala.
sinaloa Evans, 1963b, 288; ♂, Sinaloa, Mexico.
tenochca Evans, 1963b, p. 279; ♂, Morelos and state of
 Mexico.
varidens (Cameron), 1904, p. 262; ♂, Mexico (widely
 distributed in central Mexico) (synonym: *alticola* Kief-
 fer, 1911)

(1) PRISTOCERA (ACREPYRIS) QUIROGA new species

Holotype. — ♂, MEXICO: MICHOACAN: Tzintzuntzan, 8 km S. Quiroga, about 7000 feet elevation, 6 Aug. 1962 (H. E. Evans) [MCZ, No. 30,795].

Description of type. — Length 8.5 mm; LFW 5.8 mm. Body and appendages black; wings subhyaline, veins and stigma dark brown. Body clothed rather densely with silvery hairs of moderate length. Mandibles with five sharp teeth in an oblique series, the fourth tooth slightly smaller than the others. Clypeus broadly truncate, its median carina weakly arched in profile. Antennae elongate, not at all serrate; first four segments in a ratio of about 24:5:17:15, segment three 2.3 X as long as thick, segment eleven about 3 X as long as thick; flagellar pubescence pale, suberect, setulae of segment eleven .3 X as long as width of segment. Eyes with a few weak, short hairs. Head slightly wider than high; front broad, WF .66 X WH, 1.55 X HE; front angle of ocellar triangle slightly less than a right angle, OOL 1.5 X WOT. Punctures of front large, subcontiguous, the spaces between them mostly reduced to a network of round-topped ridges; median line of front less densely punctate but not impressed.

Pronotum distinctly longer than in *armifera*, with somewhat closer setigerous punctures and with finer, more numerous transverse rugulae, as in that species depressed and smooth along posterior margin; sides of pronotum in large part smooth and polished. Mesoscutum polished, the punctures small and well separated, especially between the notauli, the latter strong and

complete; scutellum wholly covered with punctures. Propodeal disc about 1.3 X as wide as long, depressed along margins of basal triangle; disc wholly covered by large reticulations, margined behind by an irregular transverse carina. Mesopleurum with large, subcontiguous punctures except the elongate callus smooth, impunctate. Claws trifold, the innermost ray blunt, the middle ray shorter than the outer ray but sloping outward so as to be nearly parallel to it. Fore wing with the discoidal cell fully outlined by pigmented streaks. Subgenital plate truncate apically. Genitalia with the parameres simple, broadly rounded apically, very much as in *cockerelli* Evans; aedeagus with the ventral valves elongate, acute apically, slightly exceeded by the blunt middle valves; distance from apex of middle valves to apex of dorsal valves about the same as that between apices of ventral and middle valves; dorsal valves slender, widely separated, each twisted mesad and ventrad apically.

Remarks. — This striking species is known only from the type. It is of special interest because of its close resemblance to *armifera* and its allies, although having the body more densely hairy, in this respect resembling *hyalina* and its allies. In my key (Evans, 1963b) *quiroga* runs well to couplet 9, separating *armifera* and *fraterna*, except that the antennae are relatively less slender, segment eleven measuring only 3 X as long as thick. This species differs from both *armifera* and *fraterna* in the genitalia and in having the middle tooth of the claws longer and more sloping, as well as in the more hairy body. However, there is little question that the species is closely related to *armifera*.

(2) PRISTOCERA (ACREPYRIS) PORTERI new species

Holotype. — ♂, BRITISH HONDURAS: Near Hummingbird Gap, Hummingbird Highway, Stann Creek Dist., 8 July 1963 (C. C. Porter) [MCZ, No. 30,866].

Description of type. — Length 12.0 mm; LFW 10.0 mm. Body black; appendages black, except basal segment of middle and hind tarsi white; wings subhyaline except clouded with brown along major veins and apical .4 of fore wing quite conspicuously clouded with brown (especially strong around and below stigma), apical .3 of hind wing weakly clouded. Mandibles with five teeth, the fourth tooth slightly smaller than the others. Clypeus with a very broad V-shaped emargination, its median carina very weakly arched in profile. Antennae elongate, not at all serrate;

first four segments in a ratio of about 37:7:22:22, segment three 2.2 X as long as thick, segment eleven 5 X as long as thick; pubescent light brown, suberect, setulae of segment eleven .2-.3X as long as width of segment; flagellum also with scattered fully erect setae (especially below) which are 2-2.5 X as long as the setulae. Eyes with sparse, short setae on the upper half. Head 1.1 X as wide as high; WF .55 X WH, 1.17 X HE; ocelli in a compact triangle on a level with the eye tops, OOL 1.38 X WOT. Front with a median linear groove and with a small median tooth just above the level of the bottoms of the eyes; punctures of front large, subcontiguous in longitudinal series, but the vertex more sparsely punctate, in fact just above the hind ocelli impunctate for a considerable space.

Pronotum very short, rounded in front, the surface of the disc with dense, transverse, setigerous punctures, obscurely transversely rugulose toward the midline. Mesoscutum polished, with strong punctures except along a median streak; notauli strong and complete; scutellum wholly covered with punctures. Propodeal disc about 1.4 X as wide as long; basal triangle well defined, slightly depressed, posterior part of disc wholly covered with irregular transverse rugae. Mesopleurum wholly covered with close-set punctures, the callus ill-defined. Claws trifold, the middle ray close to the outer ray, obliquely truncate, thicker than the outer ray and about as long; inner ray short and blunt. Fore wing with the discoidal cell fully outlined, the first recurrent vein strong, the subdiscoidal vein continuous to the outer wing margin. Subgenital plate truncate apically. Genitalia almost exactly as in *sinaloa* Evans (see Evans, 1963b, Fig. 28) except in details of the aedoeagus; the latter is very similar basally, but the median apical lobes are broader and are broadly truncate apically, while the lateral apical lobes are simple and finger-like, considerably exceeding the median lobes.

Remarks. — This species, known only from the type, is by far the largest species of Bethyilidae known from the Western Hemisphere (it is exceeded slightly by a few African species). In my key (1963b, p. 252) it runs to couplet 18; the antennae and most details of the genitalia agree with *sinaloa* Evans, but the color of the tarsi is the same as in *palliditarsis* (Cameron). *P. porteri* is considerably larger than both those species and also has more slender antennae, a mid-frontal tooth, and quite different apical aedoeagal lobes.

2. Genus *APENESIA* Westwood

- Apenesia* Westwood, 1874, p. 170 (type species *A. amazonica* Westwood, designated by Westwood, 1881). —Westwood, 1881, p. 130. —Ashmead, 1902, p. 271. —Kieffer, 1905b, p. 255. —Kieffer, 1908a, p. 25. —Kieffer, 1914, pp. 391-396 (key to spp. of world, ♀ ♀ [♂ misidentified]). —Evans, 1963d, pp. 249-359 (revision of American spp.).
- Aeluroides* Tullgren, 1904, pp. 428-430 (type species *A. sjöstedti* Tullgren, monobasic; synonymy by Kieffer, 1914).
- Propriostocera* Kieffer, 1905b, p. 247 (type species *P. interrupta* Kieffer, designated by Kieffer, 1914; synonymy by Evans, 1963d). —Kieffer, 1908a, p. 23. —Kieffer, 1914, pp. 484-488. —Evans, 1958, pp. 289-296.
- Cleistopyris* Kieffer, 1910b, p. 48 (type species *C. punctatus* Kieffer, 1910 [preoccupied in *Apenesia*, renamed *A. peruana* Evans, 1963d], designated by Kieffer, 1914; synonymy by Evans, 1963d). —Kieffer, 1914, pp. 490-494.
- Dipristocera* Kieffer, 1914, pp. 471-472 (type species *Pristocera microchela* Kieffer, monobasic; synonymy by Evans, 1963d).
- Neopristocera* Benoit, 1957, pp. 44-46 (type species *N. triloba* Benoit, original designation; synonymy by Evans, 1963d) (generic name preoccupied by Yasumatsu, 1955).

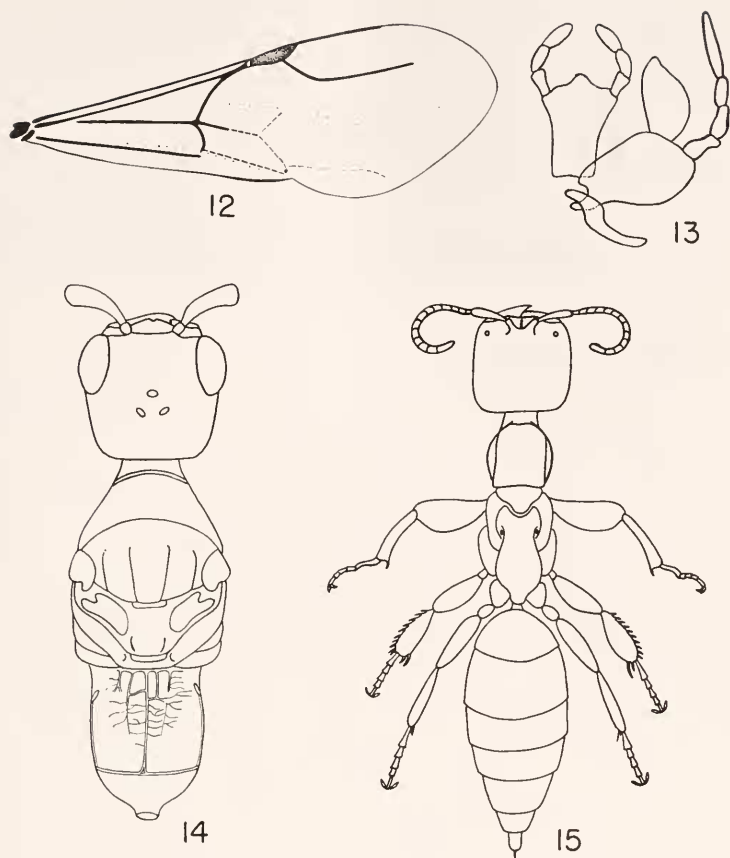
Generic characters.—*Males.* Maxillary palpi with six segments, essentially as in *Pristocera*, except a very few species with 5-segmented palpi; labial palpi with three segments. Mandibles with from three to five teeth, or occasionally all but the apical tooth confluent to form a single cutting edge; clypeus with a median lobe which may be truncate, rounded, angulate, bidentate, or tridentate, but never trapezoidally produced as in *Pseudisobrachium*; eyes glabrous, except with sparse, short hair in a very few species; antennae 13-segmented, filiform, the flagellar pubescence usually erect and bristling, in a few species subappressed and exceeded by some longer, erect setulae; occipital carina complete. Pronotum of variable shape, with or without a transverse carina anteriorly, with or without a transverse groove posteriorly; notauli complete or nearly so in most species; scutellum with a transverse groove at base; propodeum with basal triangle not marked off by a groove or carina, though usually more heavily sculptured than rest of disc, which is generally smooth or weakly striate or alutaceous; propodeal disc with or without a transverse carina behind; claws dentate. Fore wing with costa extending well past stigma as a strong vein (a few exceptions); discoidal vein usually distinct, discoidal cell often

outlined by weak veins. Abdomen sessile or petiolate. Subgenital plate simple, with a long basal stalk. Genitalia with the parameres simple or somewhat bilobed, never deeply divided; cuspis divided into a simple dorsal and a setose ventral arm (except in a few species); vannus absent; aedeagus complex, with from two to several apical lobes, but never consisting of three distinct sets of valves as in *Pristocera* (*Acrepyris*).

Females. Maxillary palpi with four segments, labial palpi with two or three segments. Mandibles with from two to four teeth; clypeus emarginate, truncate, or somewhat produced medially; eyes small, usually longer than wide, with from 1 to about 15 facets each; head usually longer than broad, but in a few species nearly square or very slightly broader than long; antennae short, 13-segmented, filiform or somewhat incrassate. Thorax not constricted behind pronotum; mesonotum short, rounded behind, anterior margin of propodeum broad, in broad contact with the mesonotum; propodeum weakly to fairly strongly constricted at or near the spiracles, often somewhat hour-glass shaped, its maximum width from 1.2 to 1.8 X its width at the constriction, sides of propodeum behind the constriction either straight or arched; mesopleura with a small dorsal and a large lateral surface, the thorax distinctly wider across the mesothorax than elsewhere; middle tibiae spinose above. Abdomen sessile or with a short or fairly long petiole. (Figs. 12-15.)

Remarks.—The synonymy of Kieffer's names *Propristocera*, *Cleistopyris*, and *Dipristocera* has been discussed elsewhere (Evans, 1963d). As pointed out in that paper, *Apenesia* occupies a central position in this subfamily, and certain species approach those of each of the other genera fairly closely. While males of *Dissomphalus* can invariably be separated by the characteristic modifications of the second tergite, and males of *Pseudisobrachium* by the divided parameres, there is no really hard and fast way of separating males of *Pristocera* and *Apenesia*. The females of these two genera can be separated by somewhat arbitrarily defining the permissible degree of constriction of the propodeum, also by the number of segments in the maxillary palpi. It may someday be found undesirable to maintain these two groups as separate genera.

Biology.—The females of this genus are generally taken in Berlese samples or found under bark or in rotten wood. There are two records of species from the Eastern Hemisphere having been reared from larvae of Curculionidae occurring in roots or



Apenesia spp. Fig. 12. Fore wing of *A. truncaticeps* (Kieffer), male. Fig. 13. Labium and maxilla of *A. chontalica* Westwood, female. Fig. 14. Head and thorax of *A. truncaticeps* (Kieffer), male. Fig. 15. *A. chontalica* Westwood, female.

stems (for details see Evans, 1963d). The males are most often taken in sweepings or on honeydew; a few species come to light at night in arid regions.

Distribution.— This genus occurs throughout the tropics and subtropics of the world. There are numerous species of *Apenesia* in the Ethiopian and Oriental regions, and the genus is abundantly represented in the Philippines. I have seen species from

Java, New Guinea, and Australia, and from the Bismareks, Solomons, Samoa, and the Society Islands. In the New World the genus occurs from Argentina and Bolivia north to southern United States, with one species ranging north to Illinois and New York. Three species have been described from the Greater Antilles, but none is currently known from the Lesser Antilles. In my recent revision of this group I recognized 63 species. Three additional species are described in the present paper, one other (*coarctatus* Kieffer) is reassigned to this genus, and another (*insolita* Evans) is here removed to *Parascleroderma*.

Included American species:

United States

chiricahua Evans, 1963d, p. 306; ♂, Arizona (also Mexico).

cochise Evans, 1963d, p. 296; ♂, Arizona.

dissomphaloides Evans, 1963d, p. 297; ♂, Arizona.

exilis Evans, 1963d, p. 293; ♂, Arizona (also California).

martini Evans, 1963d, p. 294; ♂, Florida.

mohave Evans, 1963d, p. 308; ♂, California (also Baja California).

pallidula Evans, 1963d, p. 300; ♂, Arizona.

parapolita Evans, 1963d, p. 322; ♂, South Carolina (widely distributed in eastern U.S.) (new name for *polita* Evans, 1958, preoccupied) (♀ described by Evans, 1963d, p. 347).

pima Evans, 1963d, p. 292; ♂, Arizona.

Mexico and Central America

amoena Evans, 1963d, p. 353; ♀, Costa Rica.

angustata Evans, 1958, p. 295; ♂, Costa Rica.

bugabensis (Cameron), 1888a, p. 453; ♂, Panama (also Costa Rica).

chontalica Westwood, 1881, p. 131; ♀, Nicaragua (Mexico to Costa Rica).

denticulata Evans, 1963d, p. 298; ♂, Veracruz, Mexico (new name for *tridentata* Evans, 1958, preoccupied).

flavipes Cameron, 1888a, p. 449; ♀, Panama.

guatemalensis Evans, 1963d, p. 278; ♂, Guatemala.

laevigata Evans, 1958, p. 293; ♂, Veracruz, Mexico.

malinche Evans, 1963d, p. 309; ♂, Puebla, Mexico.

maya Evans, 1963d, p. 316; ♂, Guatemala.

mexicana (Cameron), 1904, p. 263; ♂, Mexico (Morelos).

microchela (Kieffer), 1911, p. 214; ♂, Tabasco, Mexico (also Veracruz).

olmecca Evans, 1963d, p. 329; ♂, Veracruz, Mexico.

paradoxa Evans, 1963d, p. 349; ♀, Panama.

peculiaris Evans, 1963d, p. 310; ♂, Panama.

pilicornis Evans, 1963d, p. 270; ♂, Panama (also Costa Rica, Venezuela).

punctata (Cameron), 1888b, p. 173; ♂, Veracruz, Mexico.

sulcata Evans, 1963d, p. 283; ♂, Panama.

tarascana Evans, 1963d, p. 326; ♂, Michoacan, Mexico.

testaceipes (Cameron), 1888a, p. 452; ♂, Panama.

tlahuicana Evans, 1963d, p. 327; ♂, Morelos, Mexico.

West Indies

cubensis Evans, 1963d, p. 313; ♂, Cuba.

delicata Evans, 1963d, p. 352; ♀, Jamaica.

dominica Evans, 1963d, p. 352; ♀, Dominica.

South America

alutacea Evans, 1963d, p. 331; ♂, Venezuela.

amazonica Westwood, 1874, p. 171; ♀, Brazil.

angusticeps Evans, 1963d, p. 275; ♂, Bolivia.

brasilensis (Kieffer), 1910a, p. 298; ♂, Brazil.

browni Evans, n. sp. described below from ♀, Brazil (sp. 1).

coarctatus (Kieffer), 1910a, p. 292; ♂, Brazil (new combination).

columbana (Westwood), 1874, p. 164; ♂, Colombia (also Panama).

crenulata (Kieffer), 1910a, p. 289; ♂, Brazil.

elongata Evans, 1963d, p. 276; ♂, Brazil.

flammicornis Evans, 1963d, p. 287; ♂, Bolivia.

fulvicollis (Westwood), 1874, p. 165; ♂, Brazil.

funebri Evans, 1963d, p. 286; ♂, Brazil.

inca Evans, 1963d, p. 319; ♂, Peru (also Ecuador).

laticeps Evans, 1963d, p. 345; ♂, Brazil.

leucophthalma Evans, n. sp. described below from ♀, Brazil (sp. 2).

neotropica Evans, 1963d, p. 318; ♂, Brazil (new name for *paraensis* Kieffer, 1910a, p. 298, preoccupied).

nitida (Kieffer), 1910b, p. 49; ♂, Peru.

ornata Evans, 1963d, p. 272; ♂, Brazil.

pallidicornis Evans, 1963d, p. 289; ♂, Brazil.

- pando* Evans, 1963d, p. 311; ♂, Bolivia (new name for *percurrrens* Kieffer, 1910b, p. 52, preoccupied).
paraensis Kieffer, 1910a, p. 290; ♂, Brazil.
peruana Evans, 1963d, p. 337; ♂, Peru (new name for *punctatus* Kieffer, 1910b, p. 48, preoccupied).
photophila (Ogloblin), 1930, p. 20; ♂, Argentina.
quadrata Evans, 1963d, p. 344; ♂, Brazil.
reducta Evans, 1963d, p. 277; ♂, Brazil.
santacatarinae Evans, n. sp., described below from ♂, Brazil (sp. 3).
striatula Evans, 1963d, p. 285; ♂, Brazil.
substriata Kieffer, 1904b, p. 365; ♀, Bolivia.
tenebrosa Evans, 1963d, p. 273; ♂, Brazil.
transversa Evans, 1963d, p. 333; ♂, Brazil.
truncaticeps (Kieffer), 1910b, p. 50; ♂, Bolivia (also Peru) (synonyms: *punctaticeps* Kieffer, 1914; *bolivienensis* Ogloblin, 1938).
venezuelana Evans, 1963d, p. 335; ♂, Venezuela.
zamora Evans, 1963d, p. 332; ♂, Ecuador.

(1) *APENESIA BROWNI* new species

Holotype. — ♀, BRAZIL: Amazonas, High Falls, Rio Taruma, 28 Aug. 1962 (W. L. Brown) [MCZ, No. 30,796].

Description of type. — Length 3 mm; LH 0.54 mm; LT 0.88 mm. Entire body pale castaneous, head and thorax slightly darker than abdomen; extreme base of first abdominal tergite black; legs testaceous; antennae pale castaneous, fading to testaceous apically. Body clothed with short, golden setae, rather dense on the head, slightly less so on the thorax and legs; abdomen sparsely setose on all segments. Maxillary palpi short, but with four segments. Mandibles slender, terminating in two strong teeth. Clypeus broadly, angularly emarginate, revealing the semicircular labrum beneath; median ridge strong although very short. Head 1.22 X as long as wide, its sides subparallel on the anterior two-thirds, weakly converging behind, the vertex forming a straight line. Eyes minute and difficult to detect, apparently consisting of a single facet each and only very slightly paler than the color of the integument. Front shining, obscurely alutaceous and not at all so above; punctures small but clearly defined, on the center of the lower front separated by no more than their own diameters, but much more sparse above and on

the sides of the head. Scape curved, about 3 X as long as its maximum width; flagellum only about twice as long as scape, strongly incrassate, antennal segment eleven nearly twice as wide as long, 1.6 X as wide as segment three.

Pronotal disc 1.22 X as long as its posterior width, rather flat, without an anterior notch, but with a delicate arching carina margining the disc anteriorly. Surface of pronotum shining, obscurely alutaceous, the punctures largely absent from a broad median strip. Mesonotum about half as long as wide. Mesopleurum with only a small dorsal part, the thorax measured across the mesopleural shoulders only .32 mm, which is 1.15 X the width across the posterior part of the pronotal disc, .7 X the head width. Propodeum 1.85 X as long as its maximum width, maximum width only 1.3 X minimum width; constriction far forward, just behind spiracles, sides of propodeum behind constriction straight, weakly diverging to crest of declivity, which is quite abrupt; propodeal formula 17:14:19; propodeal disc shining, with a few weak punctures on the sides; declivity alutaceous. Middle tibiae with strong spines. Abdomen sessile.

Remarks.— This is a striking species which on first glance would appear to belong to *Dissomphalus*, for the propodeum is weakly constricted and the mesopleurum not nearly as strong as it typically is in *Apenesia*. However, the four-segmented maxillary palpi and sessile abdomen at once place it in *Apenesia*. The eyes are even more reduced than they are in *paradoxa* Evans, a not dissimilar species described from Panama.

(2) APENESIA LEUCOPHTHALMA new species

Holotype.— ♀, BRAZIL: Rio Grande do Sul, Caxias do Sul, Nov. 1959, 700 meters (F. Plaumann) [MCZ, No. 30,797].

Description of type.— Length 6.5 mm; LH 1.23 mm; LT 2.20 mm. Head and thorax dark castaneous, suffused with fuscous on the center of the head, both above and below, also on the pronotum and mesopleura; abdomen shining, bright rufo-castaneous except basal segment black at extreme base, dark castaneous in the center of the tergite, apical two segments fading to testaceous; scape rufo-testaceous, flagellum light brown except basal several segments annulated with darker brown; legs wholly testaceous, the front coxae and femora slightly darker than the remainder of the legs. Body with golden setae which are rather short, except longer on the abdominal venter and apical tergites. Mandibles

slender, the apex strongly oblique, bearing four teeth, of which the basal two are small and blunt. Clypeus broadly truncate, with a sharp median ridge which is angularly declivous apically. Head 1.28 X as long as wide, widest near the eyes, the sides arcuately convergent behind to a narrow, nearly straight vertex. Eyes remarkably large although consisting of a single subcircular lens, the eyes white in color, in strong contrast to the dark castaneous head; eye height about .2 X the distance between the eyes, approximately equal to the maximum width of the flagellum. Front moderately shining, very densely punctate, the punctures tending to be subcontiguous in longitudinal series on both the front and back of the head, less so on the sides; middle of front with a linear impression which turns into a narrow impunctate strip toward the vertex. Scape curved, about 3 X as long as its maximum width; flagellum not incrassate, nearly 3 X as long as the scape.

Pronotal disc about 1.5 X as long as its posterior width, without an anterior notch, surface shining, non-alutaceous, with large, well spaced punctures, but the side pieces more closely punctate and with fine longitudinal ridges. Groove between the pronotum and mesonotum deep, the latter subtriangular, slightly emarginate in front. Thorax as a whole quite slender, at its widest part, across the mesopleura, measuring about 1.2 X the posterior width of the pronotal disc; dorsal parts of mesopleura strongly rounded; surface of mesopleura punctate and with fine, irregular longitudinal ridges, especially below. Propodeum slender and with a weak constriction which is far forward; maximum length 2.5 X maximum width; distance from constriction to median anterior point of propodeum only about half the width at the constriction; sides, behind the spiracles, straight and weakly divergent; formula 15:12:18; disc shining, covered with large punctures except along a narrow median strip. Middle tibiae with strong spines on the apical third only. Abdomen sessile.

Remarks.—This large and striking species has no known close relatives. The large, white, single-faceted eyes are unique, and the shape of the propodeum unusual.

(3) APENESIA SANTACATARINAE new species

Holotype.—♂, BRAZIL: Santa Catarina, Nova Teutonia, 7 May 1937 (Fritz Plaumann) [BMNH].

Description of type.—Length 5.2 mm; LFW 3.3 mm. Head black except clypeus rufo-testaceous; thorax dark brownish-fuscous except collar testaceous, posterior margin of pronotum light brown, propleura largely castaneous; abdomen dark brown, shining, the tergites indistinctly annulated with paler brown; mandibles testaceous, the teeth rufous; scape testaceous, flagellum pale castaneous except somewhat infuscated at extreme apex; tegulae testaceous; legs wholly light yellowish-brown; wings subhyaline, veins and stigma brown. Mandibles with three strong teeth in an oblique series. Clypeus with the median lobe broad and short, obtusely angulate except the tip bidentate; median carina low, weakly arched in profile. First four antennal segments in a ratio of about 20:6:12:11, segments three and eleven each about 2.5 X as long as thick; pubescence pale, suberect, longest setulae of segment eleven about half as long as width of segment. Front strongly alutaceous, moderately shining, punctures fairly strong, separated by from 0.5-1.5 X their own diameters. Eyes wholly covered with short hairs, the hairs as long as in many species of *Pseudisobrachium*, but more sparse. Head higher than wide, WH .93 X LH; WF .58 X WH, 1.15 X HE; inner orbits convergent below. Front angle of ocellar triangle much less than a right angle; OOL 1.3 X WOT. Vertex evenly rounded off a distance above eye tops equal to about two-thirds X HE.

Pronotum moderately long, its sides concave as seen from above, transverse carina at front margin of disc strong; surface strongly alutaceous, strongly punctate except along median line, which is weakly elevated, notauli complete, nearly parallel; mesoscutum and scutellum alutaceous and with strong punctures. Propodeal disc elongate, .96 X as wide as long; median carina elongate but not quite reaching the transverse carina; disc with only weak sculpturing, the basal triangle not strongly set off or with strong sculpturing. Mesopleurum alutaceous, callus not strongly differentiated. Middle tibiae weakly spinose above. Fore wing with the discoidal vein arising far down on the transverse median vein, discoidal cell wholly weakly outlined. Abdomen sessile. Subgenital plate broadly truncate. Genitalia with the parameres moderately large, with an angulation on the outer margin and a large mesal lobe (shaped about as in *venezuelana* Evans); ventral arms of digiti very broad and short, truncate apically; aedoeagus with a pair of slender ventral rami and a pair of simple, rounded apical lobes (much as in *inca* Evans).

Paratype.—BRAZIL: 1 ♂, same data as type except 24 April 1938 [BMNH].

Variation.—The paratype is considerably smaller than the type (LFW 2.6 mm). WH is .91 X LH; WF is 1.10 X HE; OOL is 1.5 X WOT. The vertex is somewhat more narrowly rounded and more strongly produced above the eye tops than in the type. Otherwise the resemblance is very close.

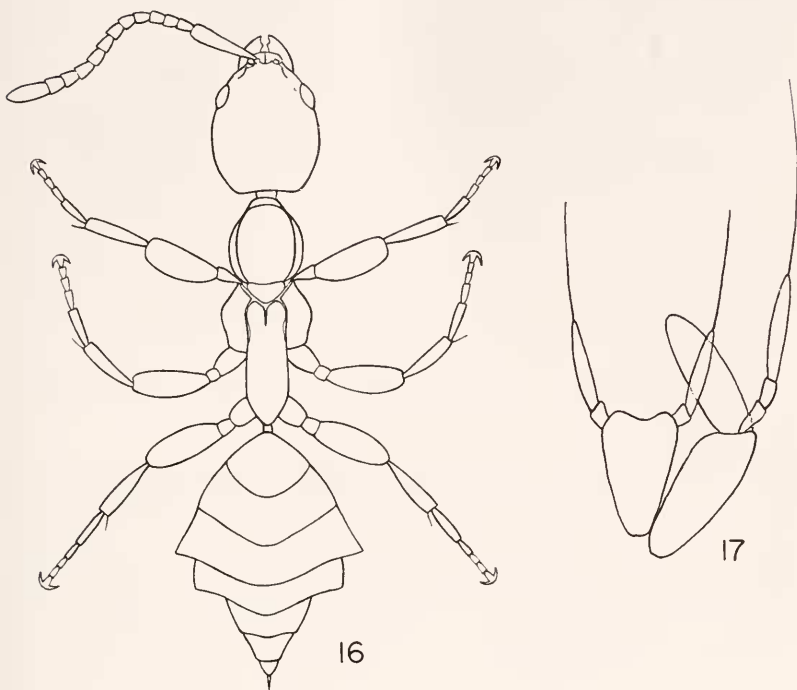
Remarks.—This species keys readily to *inca* in my key to species of this genus. There can be no question of its close relationship to that species; the mandibles and clypeus are virtually the same, the pronotum and propodeum very similar, the aedoeagus strikingly similar. However, the head is much longer than in that species, the eyes are hairier, the propodeum is longer and with weaker basal sculpturing, and the parameres are different.

3. Genus PARASCLERODERMA Kieffer

Parascleroderma Kieffer, 1904b, p. 376 (type species *P. fulviceps* Kieffer, original designation). —Kieffer, 1905a, p. 103. —Kieffer, 1905b, p. 257. —Kieffer, 1906a, p. 425 (European spp.). —Kieffer, 1908a, pp. 42-43. —Kieffer, 1914, pp. 250-252 (spp. of world). —Berland, 1928, pp. 129-130. —Maneval, 1930, pp. 53-61.

Generic characters (of female; male unknown).—Small wasps (1.5-4 mm) of testaceous, brown, or black coloration, completely apterous, strongly depressed. Head considerably wider than maximum width of thorax; maxillary palpi with three segments, the apical segment much longer than the basal two, terminating in a bristle which is longer than the entire palpus; labial palpus with two segments, the apical segment much longer than the basal and also terminating in a bristle which is longer than the palpus; mandibles with two or three apical teeth; clypeus broadly rounded, truncate, or somewhat emarginate; eyes small but with numerous (14-40) distinct, convex facets, glabrous; malar space strong, about half as long as eye height, eyes removed from posterior margin of head by three or more times their own height; eye height about .25 X head width; antennae simple, with 13 segments, flagellum slender, not incrassate; occipital carina complete; ocelli absent. Thorax constricted between pro- and mesothorax, pronotum very long, transversely convex, without a flattened disc; mesonotum small, subtriangular, convex; mesopleura very strong dorsally, forming much the widest part of the thorax; propodeum very long, weakly constricted at the spiracles, its maximum width 1.2-1.35 X its minimum width;

femora incrassate; middle tibiae smooth, completely without spines. Abdomen with a short petiole, rather broad, considerably broader than head or thorax. (Figs. 16, 17.)



Parascleroderma spp. Fig. 16. *P. carinata* n. sp., female holotype (this specimen was mounted from alcohol, and the distortion of the abdomen is an artifact of drying). Fig. 17, *P.* sp. (African), labium and maxilla, female.

Remarks. — In describing *Apenesia insolita*, I pointed out that this species differs from typical *Apenesia* females in several respects and appears to be related to European and African species which have been placed in the genus *Parascleroderma*. Since that time I have seen additional material of this genus, including another American species, described below. I now feel that *Parascleroderma* should be maintained as a separate genus, at least until such time as the males are discovered and a better insight into the relationships of these species can be attained.

Since *Parascleroderma* shares certain of the characters of *Apenesia* and *Dissomphalus*, it seems possible that the males will be found to fall into what I have called the *dissomphaloides* species-group of *Apenesia*.

Biology.—These are among the most strongly flattened of Bethyliidae, suggesting that they may occur under bark or in crevices in wood. The available records indicate that this is, in fact, the normal habitat. *P. scobiciae* Kieffer is said to attack the bostrychid beetle *Scobicia chevrieri* (Berland, 1928), while *P. berlandi* Maneval attacks the larvae of the predaceous clerid beetle *Thanasimus formicarius* (Maneval, 1930). Maneval has described the manner in which the wasp paralyzes the prey and drags it backward into a crevice. The single egg is laid longitudinally on the side of the thorax of the beetle larva. Maneval described and figured the larva and cocoon of *P. berlandi*.

Distribution.—Southern Europe and Africa; in the Western Hemisphere known only from southern Texas and from Tamaulipas, Mexico.

Included species.—This genus includes several species in Europe and Africa, including *scobiciae* Kieffer (France), *berlandi* Maneval (France), *rugosulum* Kieffer (Gibraltar), *fulviceps* Kieffer (Sicily), *nigriceps* Kieffer (Italy), *unicolor* (Westwood) (Morocco), *seychellensis* (Kieffer) (Seychelle Islands), and *nigrum* Brues (South Africa). In the New World only two species are presently known, each from a single specimen:

carinata Evans, n. sp. described below from ♀, Tamaulipas, Mexico.

insolita (Evans), 1963d, p. 350; ♀, Texas (new combination).

PARASCLERODERMA CARINATA new species

Holotype.—♀, MEXICO: Tamaulipas: Crest first ridge west of Antiguo Morelos, 18 Nov. 1948 (E. S. Ross) [CAS].

Description of type.—Length about 1.7 mm; LH .43 mm; LT .70 mm. Body dark castaneous, shining, the propodeum and mesopleura very dark, almost piceous; mandibles and clypeus very light brown; antennae medium castaneous; legs dark brown except trochanters and tarsi very light brown. Body setae very short, very sparse except on legs. Mandibles with two sharp apical teeth and with a broad, indistinct third, basal tooth. Apical margin of clypeus prominent, broadly rounded; median carina

very strong, arched in profile. Head 1.37 X as long as wide, its sides strongly arched, the head much wider near the middle than in front or behind; vertex straight across in anterior view, the occipital carina strong, visible at crest of vertex in anterior view. Eyes relatively large, broadly elliptical, each with about 25 facets; HE .33 X distance between eyes across front, .25 X WH. Front strongly polished, non-alutaceous, punctures minute and widely spaced. Flagellum slender, not at all incrassate, more than three times as long as scape; antennal segment eleven slightly longer than wide.

Pronotum rather long and transversely convex, polished and obscurely punctate. Mesonotum slightly wider than long, polished, strongly elevated so that in side view the mesonotum protrudes distinctly above the general surface of the thorax. Propodeum elongate, measuring 2.4 X as long as its maximum width (which is well behind the spiracles); maximum width 1.2 X minimum width (at the spiracles); base of propodeum with a strong Y-shaped carina, the stem of the Y extending backward about one-third the distance to the constriction, the surface somewhat depressed on each side of the stem; surface of disc strongly polished except finely shagreened on posterior third. Mesopleura very prominent, the dorsum of the thorax about twice as wide across the mesopleura as across the propodeal constriction or the constriction between the pronotum and mesonotum. Legs smooth and completely without spines, even the middle tibiae. Abdomen with a short petiole (Fig. 16).

4. Genus DISSOMPHALUS Ashmead

Disсомphalus Ashmead, 1893, pp. 41-43 (type species *D. xanthopus* Ashmead, original designation). —Kieffer, 1905b, pp. 249-250. —Kieffer, 1908a, pp. 35-36. —Kieffer, 1914, pp. 495-503 (key to spp. of world). —Evans, 1955, pp. 288-309 (spp. occurring in U.S.). —Benoit, 1957, pp. 20-26 (African spp.). —Evans, 1962b, pp. 65-78 (U.S., Mexican, and Antillean spp.).

Ecitopria Wasmann, 1899, p. 55 (type species *E. crassicornis* Wasmann, monobasic; synonymy by Evans, 1955). —Ashmead, 1902, p. 270. —Kieffer, 1905b, pp. 256-257. —Kieffer, 1908a, p. 43. —Kieffer, 1914, pp. 285-286.

Dissemphalus Ashmead, 1902, p. 271 (error for *Disсомphalus*).

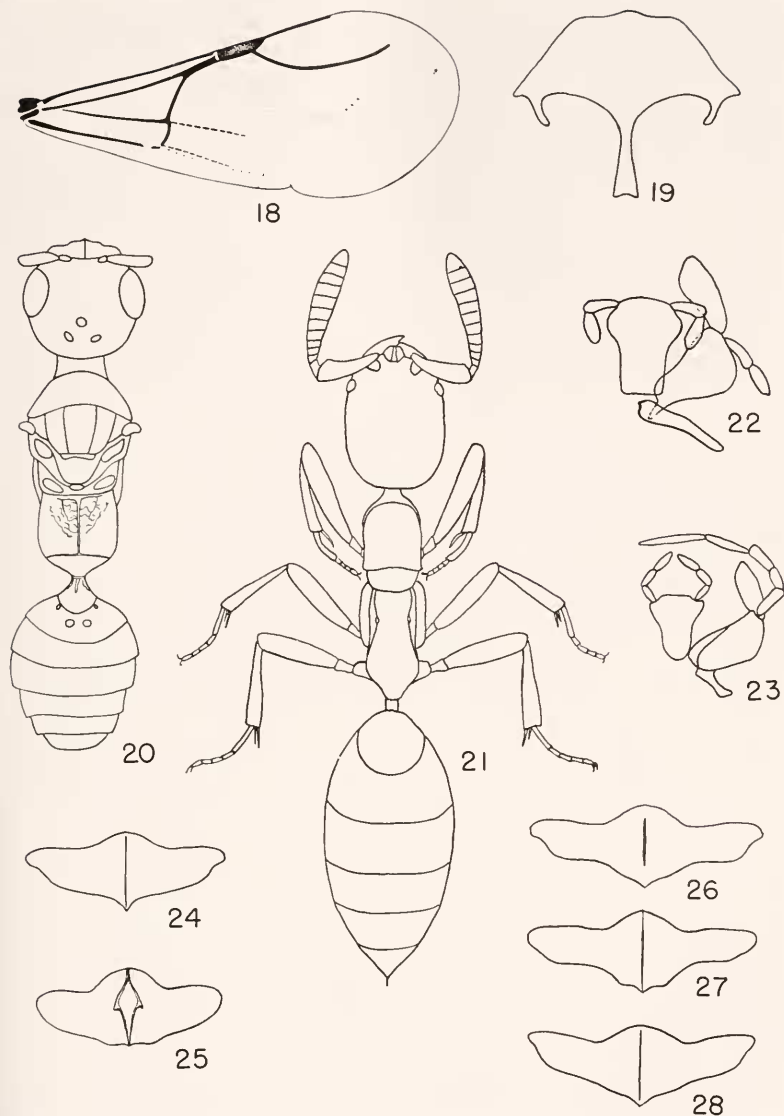
Thaumatepyris Kieffer, 1910b, p. 47 (type species *T. punctatus* Kieffer, monobasic; new synonymy). —Kieffer, 1914, p. 504.

Glenobethylus Kieffer, 1910b, p. 50 (type species *G. montanus* Kieffer, monobasic; new synonymy). —Kieffer, 1914, pp. 494-495.

Parecitopria Ogloblin, 1930, pp. 15-17 (type species *P. azarai* Ogloblin, monobasie; new synonymy).

Generic characters.—*Males.* Maxillary palpi with five segments, labial with three; mandibles with from two to four teeth, in some species only the apical tooth distinct, the other teeth fused to form a simple cutting edge; clypeus without a well-defined median lobe, the entire margin prominent, midline somewhat produced and angulate, or the apex tridentate; median line of clypeus carinate; eyes glabrous or covered with short, rather inconspicuous hairs; antennae 13-segmented, in many species the outer flagellar segments somewhat barrel-shaped, so that the antennae are submoniliform; flagellar pubescence coarse and suberect, flagellum also with a few erect setae which stand above the pubescence; occipital carina complete although usually rather weak dorsally. Pronotum short, surface usually smooth, occasionally weakly rugulose or carinate along the anterior margin of the disc; notauli linear, sometimes incomplete; groove at base of scutellum very thin; propodeum short, disc with transverse carina behind (sometimes weak and irregular), disc more or less reticulately sculptured, sometimes more heavily sculptured in basal triangle, which may be slightly depressed; claws dentate, sometimes very weakly dentate or apparently simple. Fore wing with costa extending well past stigma as a distinct vein; basal vein reaching subcosta far basad of stigma; transverse median vein erect or nearly so; discoidal vein often distinct, discoidal cell closed in a few species. Abdomen sessile or subsessile, relatively broad and short. Second tergite bearing one or two pairs of pale or roughened spots, depressions, pits, tufts of setae, or tubercles; these may be lateral or submedian in position and may have setae associated with them. Subgenital plate simple, with a long median basal stalk. Genitalia very broad; parameres simple or weakly bilobed; cuspides in the form of simple, straight or curved rods; aedoeagus exceedingly complex, consisting of several rather loosely consolidated valves and lobes, some of them often with serrated margins.

Females. Maxillary and labial palpi both very short, each with only one or two segments. Mandibles slender, terminating in three or four teeth; clypeus with a median lobe which is truncate or somewhat rounded; eyes small, each with from 2 to about 25 facets (in one known species eyes reduced to a single facet each); head longer than wide, its sides somewhat convex; antennae 13-segmented, short, incrassate apically. Mesonotum short,



Dissomphalus spp. Fig. 18. *D. apertus* Kieffer, male, fore wing. Fig. 19. *D. plaumanni* n. sp., male, subgenital plate. Fig. 20. *D. apertus* Kieffer, male, dorsal view. Fig. 21. *D. scrupus* n. sp., female, dorsal view. Fig. 22. *D. claviger* n. sp., female, labium and maxilla. Fig. 23. *D. plaumanni* n. sp., male, labium and maxilla. Fig. 24. *D. brasiliensis* Kieffer, male, clypeus. Fig. 25. *D. cornutus* n. sp., male, clypeus. Fig. 26. *D. incomptus* n. sp., male, clypeus. Fig. 27. *D. plaumanni* n. sp., male, clypeus. Fig. 28. *D. rettenmeyeri* n. sp., male, clypeus.

transverse, its posterior margin gently convex at its broad junction with the propodeum; anterior margin of propodeum not embracing sides of mesonotum to any appreciable extent; propodeal disc elongate, more or less parallel-sided, in some species slightly constricted at the spiracles, maximum width at most 1.4 X minimum width; mesopleura almost wholly lateral in position, much less prominent than in other genera of this subfamily, the thorax only slightly wider across the mesothorax than elsewhere; middle tibiae with or without spines above; middle and hind tibiae not strongly expanded and flattened. Abdomen with a distinct short or fairly long petiole. (Figs. 18-36.)

Remarks.— These wasps are often exceedingly minute, some females measuring less than a millimeter in length. Kieffer's statement that the mandibles of *Ecitopria* are simple is probably an error of observation, for the mandibles have at least three teeth in all the species I have seen. The middle tibiae are without spines in many species, but in some species there are a few weak spines (for example, the Nearctic *nigrescens*), and in several Neotropical species the tibiae are strongly spinose. Ogloblin's *Parecitopria*, described as having spinose middle tibiae, 4-toothed mandibles, and simple claws, I believe should be regarded as a synonym of *Dissomphalus*. In the males, the modifications of the second tergite assume many different forms, and there is no basis for splitting off *Thaumatopyris* for those species having a pair of spines (actually compacted setae) on this tergite. The type species of Kieffer's *Glenobethylus* has the second tergite modified as in *Dissomphalus*, although this was apparently overlooked by Kieffer. Incidentally, Kieffer is not correct in stating that the third tergite may also be modified; the pits on the third tergite of *brasiliensis* which Kieffer described are actually artifacts.

Biology.— Little is known regarding the host relationships of members of this genus. *D. crassicornis* (Wasmann) was described as a guest of the army ant *Eciton praedator* Smith, and *D. rettenmeyeri* is described below from refuse inside a log containing a colony of *Eciton burchelli* Westwood. The females are sometimes abundant in Berlese samples from soil, rotten wood, or debris in stumps and tree holes. Males have been taken in numbers at garage windows, suggesting that they may have emerged from the wooden walls. I suspect these insects attack small beetles, possibly including certain myrmecophiles. There is one record of a male being reared from a bruchid (Evans,

1955). Males are most often taken sweeping, and males of some species come to light. The males apparently carry the females about during copulation (Evans, 1962b).

Distribution. — This genus occurs throughout the warmer parts of the world. In this hemisphere, the species collectively range from Maine, Michigan, and California to Peru and northern Argentina. The genus is not definitely recorded from Europe, but it is possible that *Ecitopria proxima* Kieffer (Spain and Sardinia), *Psilobethylus luteus* Kieffer (Italy), and *P. atriceps* Kieffer (France) belong here. There are many African species, several Oriental species (including species from Sumatra and the Philippines), and at least two (undescribed) Australian species.

Included American species:

North and Central America

altivolans Evans, 1955, p. 307; ♂, Louisiana (known also from Alabama, Illinois, Texas, Arizona, and California, and from the ♀ sex).

apertus Kieffer, 1914, p. 60; ♂, Arkansas (eastern Mexico to Illinois and New York).

arizonicus Evans, 1962b, p. 70; ♂, Arizona.

barberi Evans, 1955, p. 298; ♂, Maryland (also Maine, North Carolina).

bifoveatus Kieffer, 1906b, p. 250; ♂, Nicaragua.

californicus Ashmead, 1893, p. 42; ♂, California.

chiapanus Evans, 1962b, p. 70; ♂, Chiapas, Mexico.

clausus Kieffer, 1908b, p. 18; ♂, British Honduras.

clypeatus Evans, 1955, p. 303; ♂, Veracruz, Mexico (♀ also described).

falcatus Evans, 1962b, p. 72; ♂, State of Mexico, Mexico.

foveolatus (Brown and Cheng), 1952, p. 143; ♀, Virginia (Georgia and Arkansas to Illinois and Maryland).

kansanus Evans, 1955, p. 302; ♂, Kansas (also Pennsylvania, Illinois, and Florida).

mexicana (Westwood), 1839, p. 169; ♀, Mexico (type lost; may or may not belong to this genus).

nigrescens Evans, 1955, p. 308; ♂, Texas (also Louisiana and Alabama) (probable ♀ described by Evans, 1962b, from Arkansas).

ocellatus Kieffer, 1911, p. 211; ♂, Tabasco, Mexico.

rettenmeyeri Evans, n. sp. described below from Panama, both sexes (type ♀) (sp. 5).

- rufipalpis* Kieffer, 1910b, p. 44; ♂, British Honduras.
xanthopoides Kieffer, 1914, p. 500 (new name for *xanthopus* Kieffer, 1908b, p. 13, *nec* Ashmead, 1893); ♂, British Honduras.
xanthopus Ashmead, 1893, p. 42; ♂, Maryland (Georgia, eastern Mexico, and Arizona to Illinois and Maryland) (synonym: *lucidus* Brown and Cheng, 1952, p. 146; synonymy by Evans, 1955).

West Indies

- bisulcus* Ashmead, 1894, p. 194; ♂, St. Vincent (also Grenada).
collaris Evans, 1962b, p. 73; ♂, Cuba.
confusus Ashmead, 1894, p. 194; ♂, St. Vincent (also Grenada).
politus Ashmead, 1894, p. 195; ♂, St. Vincent.
singularis Evans, 1962b, p. 77; ♀, Haiti.
tuberculatus Ashmead, 1894, p. 193; ♂, St. Vincent (also Grenada).

South America — Relatively few of the many South American species have been described. I have described below several species which are of unusual interest structurally. The following is a list of the fourteen described species.

- attaphila* (Bruch), 1916, p. 20; ♀, Argentina (new combination).
azarai (Ogloblin), 1930, p. 15; ♀, Argentina (new combination).
brasiliensis Kieffer, 1910a, p. 295; ♂, Brazil (redescribed below, sp. 3).
claviger Evans, n. sp. described below from ♀, Brazil (sp. 9).
cornutus Evans, n. sp. described below from ♂, Brazil (sp. 7).
crassicornis (Wasmann), 1899, p. 55; ♀, Brazil.
flavipes Kieffer, 1910b, p. 45; ♂, Brazil.
incomptus Evans, n. sp. described below from ♂, Brazil (sp. 4).
luscus Evans, n. sp. described below from ♀, Brazil (sp. 6).
montanus (Kieffer), 1910b, p. 50; ♂, Peru (redescribed below, sp. 2) (new combination).
platensis (Bruch), 1916, p. 22; ♀, Argentina (new combination).

plaumanni Evans, n. sp. described below from ♂, Brazil (sp. 8).

punctatus (Kieffer), 1910b, p. 47; Peru (also Ecuador) (re-described below, sp. 1) (new combination).

scrupeus Evans, n. sp. described below from ♀, Brazil (sp. 10).

(1) *DISSOMPHALUS PUNCTATUS* (Kieffer) new combination

Thaumatepyris punctatus Kieffer, 1910b, p. 47 [Type: ♂, PERU: Cajon, Bergland, Dept. Cuzco, 1500 meters elevation, 11-1-01 (Garlepp) (Berlin Museum, No. 195)]. —Kieffer, 1914, p. 504.

Description of type.—Length 6.7 mm; LFW 5 mm. Head and thorax black, abdomen dark reddish brown, shining; mandibles, scape, and sides of clypeus dull reddish brown, flagellum very dark reddish brown, nearly black; tegulae and posterior margin of pronotum brown; legs dark brown except the front tibiae and tarsi bright castaneous, middle and hind tarsi medium brown; wings faintly tinged with yellowish brown, especially in and around the radial cell, veins and stigma dark brown. Mandibles with two teeth, the inner margin convexly rounded but without additional teeth basad of the second tooth (Fig. 33). Clypeus broad and with a high median carina which is weakly arched in profile; apical margin obtusely angulate, but the median point acute (about as in *incomptus*, Fig. 26). Eyes not hairy. Antennae with first four segments in a ratio of about 16:4:5:5, segment three 1.3 X as long as thick, flagellum becoming more slender apically, segment eleven 1.9 X as long as thick; flagellar pubescence erect, bristly, some of the setulae on the apical segments nearly half as long as the thickness of the flagellum. Front alutaceous, moderately shining, with large, shallow punctures which on the lower front are separated from one another by less than their own diameters, on the vertex by slightly more than their own diameters. Eyes slightly closer together near the bottom than at the middle, WF .63 X WH, 1.33 X HE; front angle of ocellar triangle less than a right angle, OOL 1.24 X WOT; WOT 1.1 X the distance from the posterior ocelli to the vertex crest.

Pronotum short, its disc alutaceous, with close, small punctures. Mesoscutum also alutaceous, somewhat shining, with small, moderately close-set punctures; notauli strong and complete, reaching transverse groove at base of scutellum, which is long and narrow; disc of scutellum alutaceous, punctate. Propodeum

very short, the disc .62 X as long as broad; median carina strong, reaching the strong transverse carina; disc with strong, irregular, reticulate rugae, strongest toward the base; spiracles subcircular, directed dorsad. Mesopleurum wholly alutaceous, punctate except for the callus, which is convex and has only a few punctures. Claws simple although subdentate basally. Fore wing with discoidal vein rather strong, the discoidal cell completely outlined by weakly pigmented veins; subdiscoidal vein extending to wing margin as a very weakly pigmented line; first recurrent vein very weakly pigmented. Abdomen rather short and stout. Second tergite large, with a pair of shallow depressions, each giving rise to a tuft of strong setae, the tergite otherwise without setae; these depressions and tufts are well separated on the median portion of the tergite. Subgenital plate broadly truncate. Genitalia not examined.

Other males examined.—ECUADOR: 1, Abitagua, 1110 meters, 2 April 1940 (Clarke, MacIntyre) [MCZ]; 1, Puyo, Nago-Pastaxa Pr., 16 April 1958 (R. W. Hodges) [CU].

Variation.—The Ecuador specimens are slightly smaller than the type (LFW 4.0, 4.8 mm). The Abitagua specimen has the wings rather strongly suffused with yellowish, the veins amber. In both Ecuador specimens the clypeus is wholly rufous, the first three antennal segments yellowish brown. Otherwise the resemblance to the type is very close indeed.

(2) DISSOMPHALUS MONTANUS (Kieffer) new combination

Glenobethylus montanus Kieffer, 1910b, p. 50 [Type: ♂, PERU: Cosnipata-Ebene, Dept. Cuzco, 1000 meters elevation, 5-1-01 (Garlepp) (Berlin Museum, No. 200)]. —Kieffer, 1914, p. 494.

Description of type.—Length 4.5 mm; LFW 3.9 mm. Body piceous, the abdomen slightly paler than head and thorax, especially sides of basal segments; mandibles and sides of clypeus yellowish brown; antennae light brown, gradually infuscated toward the apex; tegulae testaceous; legs bright castaneous, coxae and femora slightly darker than other parts of legs; wings subhyaline, veins and stigma amber. Mandibles slender and bidentate. Clypeus with median carina weakly arched in profile; apical margin tridentate, median tooth acute, the other two rounded (as figured for *plaumanni*, Fig. 27). Antennae with first four segments in a ratio of about 3:1:1:1, segment three 1.5 X as long as thick, outer antennal segments more slender, segment eleven twice as long as thick; flagellar pubescence erect,

bristling, setulae about half as long as width of flagellum. Eyes not hairy. Front alutaceous, weakly shining, with large but very shallow punctures which are separated from one another by about their own diameters (above) or less than their own diameters (below). Eyes somewhat convergent below, WF .61 X WH, 1.28 X HE; front angle of ocellar triangle acute, OOL 1.3 X WOT, posterior ocelli removed from vertex crest by a distance slightly less than width of ocellar triangle. Vertex broadly, weakly rounded off only a short distance above eye tops, distance from eye tops to vertex crest equal to about half HE.

Pronotum short, with close but shallow punctures. Mesoscutum alutaceous and weakly shining, its punctures smaller than those of the head or pronotum; notauli complete; scutellum alutaceous, also with small punctures. Propodeum short, the disc only .6 X as long as wide; median carina strong, reaching the transverse carina; disc shining, with irregular reticulate rugae; spiracles large, subcircular, directed dorsolaterad. Mesoscutum alutaceous and punctate, callus convex and only weakly punctate. Claws simple. Fore wing with discoidal vein strong; discoidal cell closed; first recurrent vein pigmented; subdiscoidal vein as well as radial vein reaching wing margin, although very weak apically. Abdomen relatively broad and short. Second tergite large, somewhat flat, with scattered minute, subapressed setae; disc with a pair of submedian opaque spots (not notably depressed) each of which gives rise to several slender but fairly long setae. Subgenital plate broadly truncate apically. Genitalia not studied.

Remarks.—I have seen no specimens of this species other than the type. Kieffer apparently overlooked the modifications of the second tergite. Simple claws occur also in *punctatus* and several other species.

(3) DISSOMPHALUS BRASILIENSIS Kieffer

Dissomphalus brasiliensis Kieffer, 1910a, p. 295. [Type: ♂, BRAZIL: Pará (C. F. Baker) (Pomona College, Claremont, Calif.)]. —Kieffer, 1914, pp. 502-503.

Description of type.—Length 2.7 mm; LFW 2.2 mm. Body rather uniformly dark brown; mandibles light brown; scape and base of flagellum light brown, greater part of flagellum dull, medium brown; legs wholly light yellowish brown except hind femora weakly suffused with darker brown; wings hyaline, veins

and stigma brown. Mandibles slender, bidentate (as in *punctatus*, Fig. 33). Clypeus broadly expanded apically, with a single strong median, acute process; median carina strong, in profile nearly straight (Fig. 24). First four antennal segments in a ratio of about 18:7:6:6, segment three 1.5 X as long as thick, segment eleven 1.7 X as long as thick; pubescence coarse and semi-erect, setulae more than half as long as width of segments, also with some erect setae which are nearly or quite as long as width of segments bearing them. Front shining, uniformly but rather weakly alutaceous, punctures shallow and inconspicuous; eyes glabrous. Head about as wide as high; inner orbits subparallel on lower two-thirds, WF .59 X WH, 1.13 X HE; vertex extended only slightly above tops of eyes, distance from eye tops to vertex crest only about one-third X HE. Ocelli slightly enlarged, DAO .18 X WF, forming a triangle the front angle of which is less than a right angle; OOL .93 X WOT.

Pronotum sloping evenly forward to the collar, without an anterior face except as indicated by a weak transverse groove; pronotal disc, like that of the mesoscutum and scutellum, shining, weakly alutaceous, obscurely punctate. Propodeum short, barely longer than wide, the dorsal surface wider than long; median carina strong but not nearly reaching the weak and irregular transverse carina margining the disc behind; disc with reticulate sculpturing basally, otherwise smooth and strongly polished; lateral carinae strong, interrupted by the spiracles, which are large, subcircular, directed laterad. Mesopleurum somewhat shining, weakly and uniformly alutaceous, obscurely punctate. Claws simple. Fore wing with basal vein erect, forming nearly a straight line with transverse median vein, which is curved only slightly; discoidal vein interstitial with media, pigmented to a distance greater than length of basal vein, subdiscoidal vein weakly pigmented and extending well out toward wing margin, vein closing off discoidal cell also very weakly pigmented. First abdominal tergite with a rather wide, subfoveolate groove which extends more than half the length of the tergite. Second tergite with weak, anterior, sublateral opaque spots, otherwise shining, without setae except for a small group arising from each pit; pits small, separated by about 3 X their own diameter, each located toward the inner side of a shallow, dish-like concavity. [Third tergite also biconcave, but with no indication of the pits mentioned by Kieffer; this tergite is somewhat distorted on both sides and these concavities are

probably artifacts. The tip of the abdomen (beyond segment four) is wholly missing.]

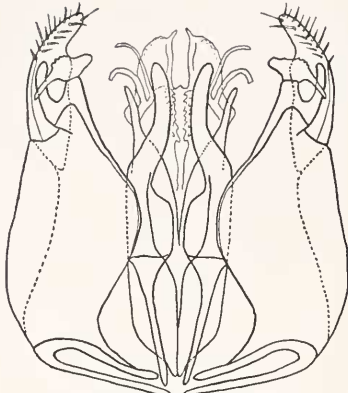
Remarks.—This species is known to me only from the type.

(4) *DISSOMPHALUS INCOMPTUS* new species

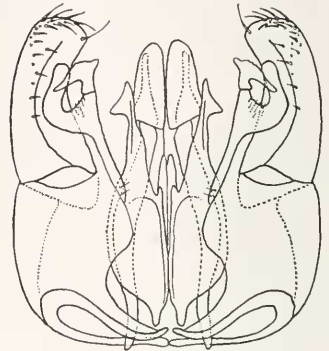
Holotype.—♂, BRAZIL: Nova Teutonia, Santa Catarina, 2 May 1938 (Fritz Plaumann) [BMNH].

Description of type.—Length 2.6 mm; LFW 1.9 mm. Entire body dark castaneous; antennae light brown basally, gradually infuscated to nearly black apically; legs medium brown, tarsi and trochanters slightly paler; wings hyaline, with dark setulae, veins and stigma brown. Mandibles very slender, terminating in three teeth, the apical tooth large, the other two teeth minute and close together (Fig. 34). Clypeus large, median portion obtusely angulate, the mid-point acute; median carina not reaching apex (Fig. 26). First four antennal segments in a ratio of about 3:1:1:1, segment three 1.4 X as long as thick, segment eleven 1.8 X as long as thick; pubescence coarse, semi-erect, setulae of segment eleven over half the width of the segment. Eyes with scattered short hairs. Front alutaceous, moderately shining, punctures shallow, on lower front separated by about their own diameters, on upper front by 2-3 X their own diameters. WF .58 X WH, 1.12 X HE; OOL 1.15 X WOT, distance from posterior ocelli to vertex crest equal to about half WOT. Vertex broadly rounded off a distance above eye tops equal to about half HE.

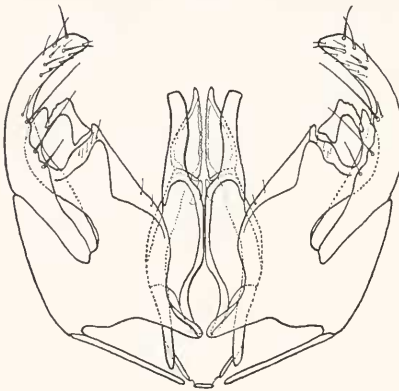
Anterior margin of pronotal disc with a rather irregular transverse carina, behind which the disc is subfoveolate; posterior part of disc alutaceous, moderately shining. Mesoscutum alutaceous, obscurely punctate; basal groove of scutellum much constricted in the middle. Propodeal disc .7 X as long as wide, strongly margined laterally and behind, covered with coarse reticulations except for a small smooth area just before the transverse carina. Mesopleurum alutaceous, callus subtended by a pair of foveolate grooves which meet at a right angle. Claws weakly dentate. Fore wing with discoidal vein strong, interstitial with median vein; subdiscoidal vein weakly pigmented, discoidal cell barely closed on outer side. First abdominal tergite with a strong median groove which extends over half its length. Second tergite with a pair of pale, roughened spots at the extreme anterior margin toward the sides of the dorsum, otherwise completely smooth and without modifications. Subgenital plate



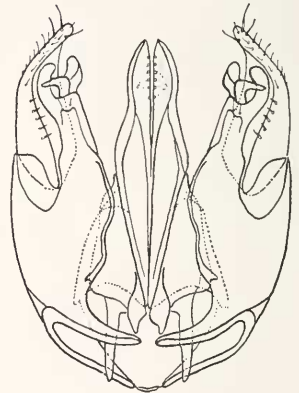
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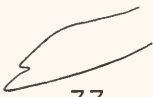
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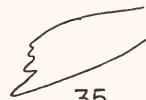
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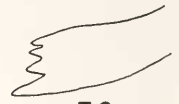
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Dissomphalus spp. Fig. 29. *D. incomptus* n. sp., male genitalia. Fig. 30. *D. rettenmeyeri* n. sp., male genitalia. Fig. 31. *D. cornutus* n. sp., male genitalia. Fig. 32. *D. plaumanni* n. sp., male genitalia. Fig. 33. *D. punctatus* (Kieffer), male, mandible. Fig. 34. *D. incomptus* n. sp., male, mandible. Fig. 35. *D. plaumanni* n. sp., male, mandible. Fig. 36. *D. cornutus* n. sp., male, mandible.

emarginate. Genitalia with the parameres short, tapering apically; aedoeagus very complex, ventral rami large, convergent, their apices divergent; dorsal body of aedoeagus with two pairs of ventral flagella which are perpendicular to the main part of the aedoeagus (Fig. 29).

Paratypes. — BRAZIL: 7 ♂♂, same data as type except various dates (19 May 1937, 2 May 1938, 29 Dec. 1938, Dec. 1962) [BMNH, MCZ].

Variation. — LFW varies from 1.5 to 2.0 mm; WF/HE varies from 1.12 to 1.20; OOL/WOT varies from 1.15 to 1.30. In some specimens the antennae are uniformly medium brown.

Remarks. — This species is of unusual interest because of the fact that the second tergite bears no real pits, hair tufts, or spines, but merely a pair of pale, dull spots anterolaterally. Similar spots occur in other species (such as *apertus* Kieffer) which also possess an additional pair of large pits mesad of these. Species such as *incomptus* stand very close to members of the *dissomphaloides* species-group of the genus *Apenesia*, in which modifications of the second tergite are altogether lacking.

(5) DISSOMPHALUS RETTENMEYERI new species

Holotype. — ♂, PANAMA: Barro Colorado Island, Canal Zone, 26 February 1955 (Berlese refuse, colony no. 55B-IV, *Eciton burchelli*; Carl W. Rettenmeyer) [USNM, No. 64,996].

Description of type. — Length 3 mm; LFW 2.2 mm. Head and thorax black, abdomen dark, shining brown; mandibles light brown; antennae light brown basally, gradually infuscated to dark brown beyond segment six; legs testaceous except front coxae and front and middle femora weakly suffused with brown, hind femora strongly suffused with dark brown; wings subhyaline, setulae dark, veins and stigma brown. Mandibles with two apical teeth, the inner tooth at the end of an oblique cutting edge (about as in *punctatus*, Fig. 33). Clypeus large, its apical margin slightly sinuate, sharply angulate medially; median carina nearly straight in profile, reaching nearly to tip of median angulation (Fig. 28). First four antennal segments in a ratio of about 15:5:4:5, segment three only 1.2 X as long as thick, segment eleven 1.6 X as long as thick; flagellum with coarse, semi-erect pubescence and with many erect setae standing somewhat above the pubescence. Eyes covered sparsely with short hairs. Front strongly alutaceous, almost beaded, weakly

shining, punctures shallow and not at all conspicuous. Eyes rather strongly convergent below, WF .55 X WH, 1.05 X HE; OOL 1.15 X WOT; posterior ocelli removed from vertex crest by approximately their own diameters. Central part of vertex nearly straight across.

Pronotal disc rather flat, oblique, ecarinate, surface strongly alutaceous and obscurely punctate like that of mesonotum; notauli complete; groove at base of scutellum long and slender. Propodeal disc about .7 X as long as wide; transverse carina strong, somewhat sinuate; median carina not attaining transverse carina; surface of disc wholly covered with strong reticulations. Mesopleurum alutaceous, with a strong, oblique, foveolate groove. Claws weakly dentate at base. Fore wing with discoidal vein long, discoidal cell weakly outlined below and apically; basal vein reaching subcosta far basad of stigma. First abdominal tergite with a deep median basal groove. Second tergite polished and without setae, with a pair of depressed pale spots laterally, close to anterior margin; each of these pale spots is set on the inner side of a broad, very shallow, slightly roughened depression. Subgenital plate shallowly emarginate apically. Genitalia with the parameres unusually broad and truncate apically; aedeagus with the ventral rami weak but with an apical wing-like expansion, dorsal body rather slender (Fig. 30).

Allotype. — ♀, PANAMA: same data as type except 5 March 1955 (refuse deposit from inside log, colony no. 55B-IV, *Eciton burchelli*; Carl W. Rettenmeyer) [USNM].

Description of allotype. — Length 2.5 mm; LH .60 mm; LT .80 mm. Body pale castaneous, abdomen slightly paler basally and apically; legs and antennae testaceous. Mandibles with four teeth, basal tooth rather broad, arching into inner mandibular margin. Clypeus with its median area short, subtruncate, median carina abruptly cut off, the margin of the clypeus as seen from below narrowly subtriangular, the apex of the triangle being formed by the end of the median carina. Upper margins of antennal scrobes carinate for a short distance on each side of the midline. First four antennal segments in a ratio of about 15:4:2:2, segment three about 1.5 X as wide as long, segment eleven about twice as wide as long; antennae moderately incrassate, apical segments with numerous elongate sensoria. Head longer than wide, LH 1.20 X WH; vertex distinctly concave when head is viewed from in front. Eyes small, dark gray, elliptical, each with six facets. Front strongly alutaceous although moderately

shining, punctures large but shallow, separated for the most part by more than their own diameters; median line of front weakly impressed.

Dorsum of thorax and propodeum strongly alutaceous, weakly shining, obscurely punctate; pronotal disc about as long as wide; mesonotum a very short transverse band; propodeum 1.9 X as long as its maximum width, maximum width 1.15 X minimum width; lateral margins of propodeal disc carinate, the two carinae weakly convergent at the spiracles. Middle tibiae with five strong spines above, not counting those at apex. Abdominal petiole rather long, measuring (in dorsal view) about .4 X the length of the hind tibia. Abdomen shining although weakly alutaceous.

Remarks. — This species is known only from the type and allotype. The male resembles *incomptus* in many ways, including the shape of the clypeus and the nature of the tergal pits. The pits are, however, somewhat larger and more sunken than in *incomptus*, and furthermore the area around them is somewhat depressed and roughened. Perhaps this species represents an intermediate stage between species with barely visible tergal pits and the many species with strongly developed pits. The female is a typical "*Parccitopria*" in the sense of Ogloblin, the petiole being long and the middle tibiae strongly spinose.

(6) *DISSOMPHALUS LUSCUS* new species

Holotype. — ♀, BRAZIL: Rio Grande do Sul, Sinimbu, 200 meters elevation, Sept. 1960 (Fritz Plaumann) [MCZ, No. 30,798].

Description of type. — Length 3.1 mm; LH .67 mm; LT 1.05 mm. Head and thorax bright castaneous; abdomen pale castaneous, shining, the petiole blackish; antennae and legs testaceous. Mandibles with four teeth. Clypeus with a rather long and narrow median lobe, the apex of which is subtruncate; median carina strong, complete. Antennal scrobes not margined by carinae. First four antennal segments in a ratio of about 5:1:1:1, segment three slightly wider than long, segment eleven about 1.5 X as wide as long; antennae rather weakly incrassate, apical segments with numerous elongate sensoria. Head elongate, somewhat barrel-shaped, the sides convergent both in front of and behind the middle; LH 1.5 X WH; vertex, in anterior view, nearly straight across, the occipital carina strong. Eyes very

small, straw-colored (paler than head), each consisting of a single facet. Front shining, barely alutaceous but strongly punctate, the punctures separated by less than their own diameters.

Pronotal disc 1.2 X as long as its posterior width, shining, strongly punctate. Mesonotum .6 as long as wide, its posterior margin arcuately embraced by the propodeum. Propodeum unusually elongate, measuring 2.8 X as long as its maximum width, 3.3 X as long as its minimum width; maximum width 1.15 X minimum width; spiracles and constriction far forward, the sides of the propodeum behind the constriction nearly straight, parallel; surface of propodeum shining on anterior half, distinctly duller and more alutaceous behind. Mesopleura without a distinct dorsal surface, as usual in the genus. Middle tibiae with several rather weak spines above. Abdominal petiole short, measuring (in dorsal view) about .3 X the length of the hind tibia. Abdomen slender, fusiform.

Paratypes. — BRAZIL: 1 ♀, same data as type [MCZ]; 1 ♀, Seara, Santa Catarina, July 1960 (Fritz Plaumann) [MCZ]; 4 ♀♀, Nova Teutonia, Santa Catarina (Fritz Plaumann) [MCZ, USNM, BSA, BMNH].

Variation. — The six paratypes vary in size from 2.4 to 3.3 mm. LH varies from 1.38 to 1.55 X WH; length of the propodeum varies from 2.6 to 2.8 X maximum width. Very little variation can be noted in this series.

Remarks. — This is the only *Dissomphalus* known to me which has the eyes reduced to a single facet each (as occurs in *Pseudisobrachium* and three known species of *Apenesia*). The species is also unusual because of the very elongate head and propodeum. The shape of the propodeum is not very different from that of some species of *Apenesia*, but the mesopleura is not nearly as well developed dorsally as it is in that genus.

(7) *DISSOMPHALUS CORNUTUS* new species

Holotype. — ♂, BRAZIL: Santa Catarina, Nova Teutonia, 15 June 1937 (Fritz Plaumann) [BMNH].

Description of type. — Length 2.3 mm; LFW 1.7 mm. Head and thorax dark castaneous; abdomen dark, shining brown except sides of basal tergite paler; basal two antennal segments light brown, remainder of antenna medium brown; legs medium brown except trochanters and tarsi very light brown; wings nearly clear hyaline, veins and stigma brown. Mandibles with four strong apical teeth, the basal two teeth very close together

(Fig. 36). Clypeus large, its apical margin weakly tridentate medially; median area of clypeus strongly elevated, each side of the elevation produced into a large, acute tooth (Fig. 25). First four antennal segments in a ratio of about 18:6:5:5, segments three and eleven each about 1.3 X as long as thick; flagellum with strong, semi-erect pubescence above which rise some fully erect setae. Eyes covered with short hairs. Front shining although uniformly alutaceous, punctures small and rather widely spaced. WF .59 X WH, 1.25 X HE; vertex broadly rounded off a distance above eye tops equal to about two-thirds X HE. OOL 1.45 X WOT; posterior ocelli removed from vertex crest by two-thirds X WOT.

Surface of pro- and mesonota alutaceous but rather strongly shining; pronotum obscurely rugulose anteriorly, but not actually carinate; notauli present only on anterior third of mesosentum; scutellar groove strong, slender. Propodeal disc .9 X as long as wide, strongly margined laterally and behind, median carina extending only two-thirds the length of the disc; apical part of disc rather smooth, base reticulate. Claws simple except weakly dentate at base. Fore wing with the transverse median vein erect, the basal vein sloping only slightly and meeting subcosta far basad of stigma; discoidal vein weakly pigmented for a short distance. Basal groove of first abdominal tergite extending about .6 X the length of the tergite. Second tergite with a few weak setae on the sides, on each side of the median line with a small pencil of rather long setae, the pencils about as long as half the distance between them; these pencils appear to rise directly from the surface, not from pits. Subgenital plate broad, subtruncate. Genitalia with the parameres strongly curved mesad, rather slender apically, bearing several extremely large setae on their inner margin; aedeagus with the ventral rami unusually large, relatively broad and blunt apically, as long as the two acute lobes of the dorsal body (Fig. 31).

Paratypes. — BRAZIL: 29 ♂♂, same data as type except various dates Dec.-Mar. 1945-46 [BMNH, MCZ].

Variation. — LFW varies from 1.2 to 1.8 mm. The front and thoracic dorsum vary from weakly alutaceous and strongly shining to rather strongly alutaceous and weakly shining. In some specimens the clypeal processes are strong, acute, and horn-like; in others they are low and obtuse. In some specimens antennal segments three and eleven are only slightly longer than thick. Variation in other features is very slight.

Remarks.—The development of the clypeus of this species is unique and immediately separates it from other known species. The modifications of the second tergite are also unusual, as are the reduced notauli.

(8) DISSOMPHALUS PLAUMANNI new species

Holotype.—♂, BRAZIL: Santa Catarina, Nova Teutonia, 26 February 1945 (Fritz Plaumann) [BMNH].

Description of type.—Length 3.8 mm; LFW 3.2 mm. Head and thorax black; abdomen very dark brown, shining, somewhat paler basally and apically; mandibles light brown; margin and sides of clypeus suffused with castaneous; antennae light castaneous, slightly infuscated apically; coxae and trochanters brown, remainder of legs light yellowish brown; wings subhyaline, veins and stigma brown. Mandibles with four teeth (Fig. 35). Clypeus large, tridentate, median tooth acute, lateral teeth rounded (Fig. 27); median carina complete, highest about mid-way, simple. First four antennal segments in a ratio of about 18:5:5:7, segment three 1.2 X as long as thick, segment eleven twice as long as thick; pubescence coarse, semi-erect, flagellum also with scattered, fully erect setae which stand slightly above the pubescence. Eyes covered with very short hairs. Front alutaceous, moderately shining, wholly covered with shallow though sharply-defined punctures which are separated by about or slightly less than their own diameters. WF .62 X WH, 1.2 X HE; ocelli in a compact triangle far removed from eyes and well removed from vertex crest; OOL 1.35 X WOT.

Pronotum very short, sloping steeply in front, transversely rugoso-punctate except toward posterior margin. Mesoscutum shining, alutaceous, wholly covered with small punctures; notauli complete, strong; groove at base of scutellum strong. Propodeal disc short, .7 X as long as wide, wholly covered with strong reticulations; median carina complete, reaching the sinuous transverse carina. Mesopleurum coarsely sculptured in front, alutaceous behind, with a broad, oblique groove. Claws with a tooth at base. Fore wing with the discoidal cell very weakly outlined, the subdiscoidal vein weakly continuous to the outer wing margin. First abdominal tergite with a strong basal groove which extends for about half the length of the tergite. Second tergite with a pair of widely separated bowl-shaped depressions, each bearing on its outer side an umbiliform elevation bearing a tuft of pale

hairs, these directed mesad and slightly caudad; each depression bearing a few additional short setae, but the tergite otherwise devoid of setae. Subgenital plate broad, somewhat sinuate apically (Fig. 19). Genitalia with the parameres very broad, subacute and curved mesad apically; aedoeagus with the ventral rami short, dorsal body bilobed, strongly compressed (Fig. 32).

Paratypes. — BRAZIL: 7 ♂♂, same data as type except dates Jan., Mar., Aug., 1945, 1961, 1963 [BMNH, MCZ].

Variation. — In the paratypes LFW varies from 2.8 to 3.3, WF from 1.07 to 1.25 X HE, OOL from 1.26 to 1.35 X WOT. Some slight variation in the strength of the punctures of the front can be noted, but otherwise this series is remarkably uniform in structure.

Remarks. — This relatively large species has much in common with *punctatus* Kieffer, from Peru.

(9) *DISSOMPHALUS CLAVIGER* new species

Holotype. — ♀, BRAZIL: Rio Grande do Sul, Erechim, 750 meters elevation, July 1960 (Fritz Plaumann) [MCZ, No. 30,799].

Description of type. — Length 1.2 mm; LH .30 mm; LT .43 mm. Body wholly pale castaneous; antennae and legs straw-colored. Body setae abundant, pale, fairly long on the thoracic dorsum. Mandibles with four teeth. Clypeus with the median lobe narrowly trapezoidal, its median carina declivous between the antennal sockets, then turning upward at nearly a right angle and abruptly, angularly cut off at the apex; apical margin of median lobe of clypeus, seen from below, forming a small triangle, the truncate median carina forming its apex. Antennal scrobes not margined. Scape much thickened apically, flagellum slender at the base and much swollen apically, the flagellum only slightly more than twice as long as the scape; antennal segments 3-8 very short, hardly more than annuli; flagellar sensoria large, arranged in four widely spaced rows, so that each segment (except the most basal segments and the apical segment) has four sensoria, only two of which can be seen from any one view of the antenna. Head with its sides strongly arcuate, so that it is much wider near the middle than in front or behind; LH 1.3 X WH; vertex slightly concave in anterior view. Eyes minute, black-rimmed, each with only two visible facets. Head wholly but very weakly alutaceous, strongly shining, punctures shallow and inconspicuous although quite numerous, especially below.

Pronotal disc very slightly longer than wide, its surface, like that of the mesonotum and propodeum, alutaceous although moderately shining. Propodeum relatively short, measuring 1.7 X as long as its maximum width, twice as long as its minimum width; maximum width about 1.2 X minimum width; sides of disc carinate, the carina parallel in front of the spiracles, behind them weakly, arcuately divergent. Mesopleura conically produced above, so that in dorsal view the mesothorax is wider than is usual in this genus. Middle tibiae with some small spines near the apex. Abdominal petiole short, measuring (in dorsal view) about .15 X the length of the hind tibia. Abdomen relatively short and stout.

Paratypes. — BRAZIL: 14 ♀♀, same data as type [MCZ, CU, USNM, BSA, BMNH]; 4 ♀♀, Sinimbu, Rio Grande do Sul, 200 meters elev., Sept. 1960 (Fritz Plaumann) [MCZ]; 14 ♀♀, N. Petropolis, 800 meters elev., Nov. 1959 (Fritz Plaumann) [MCZ, BMNH]; 15 ♀♀, Seara, Santa Catarina, Jan. 1960 (Fritz Plaumann) [MCZ, USNM, BMNH]; 20 ♀♀, Nova Teutonia, Santa Catarina, various dates (Fritz Plaumann) [MCZ, BSA]; 9 ♀♀, Chapeco, Santa Catarina, May, Aug. (Fritz Plaumann) [MCZ, BSA]; 3 ♀♀ Rio Azul, Parana, 1000 meters, Oct. 1959 (Fritz Plaumann) [MCZ].

Variations. — The 79 paratypes vary in size from about 1.0 to 1.5 mm, in color from wholly straw-colored to medium castaneous, in the latter case with paler appendages and often a slightly paler abdomen. The eyes are minute in all specimens, but in some of the larger specimens one can make out up to four rather ill-defined facets. In many specimens the front is strongly polished, barely if at all alutaceous, and in some the punctures are slightly more sharply defined than in the type, though they are never very large. Variation in head shape is negligible, but there is considerable variation in the length of the propodeum (length 1.65-1.95 X maximum width). The antennal sensoria show only slight variation throughout this long series.

Remarks. — This is apparently a common species in southern Brazil; in fact, it is known from a longer series than any other species of the genus. Unusual features include the sparse antennal sensoria and the conical processes on the mesopleura. It is possible that this is the female of *cornutus*, but the rich *Dissomphalus* fauna of Brazil is so poorly known that this would be no more than a guess at this point.

(10) DISSOMPHALUS SCRUPEUS new species

Holotype.—♀, BRAZIL: Santa Catarina, Chapeco, 600 meters elevation, Aug. 1960 (Fritz Plaumann) [MCZ, No. 30,800].

Description of type.—Length 1.7 mm; LH .45 mm; LT .54 mm. Head and thorax light castaneous; abdomen shining, slightly paler than head and thorax; legs and antennae testaceous. Body setae pale, short, relatively abundant. Mandibles with four teeth. Clypeus with the median lobe slightly wider than in *claviger*, carinate as in that species. Scape much widened apically, flagellum much swollen toward the apex, almost as much so as in *claviger*, but the sensoria much more abundant than in that species; on the outer side of each of the more apical segments (except the last) 5-6 large sensoria can be seen; the inner sides of these segments are largely devoid of sensoria, but have a pair of longitudinal streaks (each consisting of microscopic pores); apical antennal segment with many sensoria. Head with its sides strongly arcuate, so that it is much wider at the middle than in front or behind; LH 1.3 X WH; vertex straight across in anterior view. Eyes blackish, slightly larger than in *claviger*, each with four ill-defined facets. Head rather weakly shining, front alutaceous and closely covered with shallow punctures, the two together giving the front a very much roughened surface, especially above.

Thoracic dorsum alutaceous, rather weakly shining, setigerous punctures numerous but shallow and inconspicuous. Propodeum 1.8 X as long as its maximum width, 2.6 X as long as its minimum width; propodeum with a relatively strong constriction (for the genus) at the spiracles, maximum width 1.4 X minimum width. Mesopleura not produced above; middle tibiae simple, without spines. Abdominal petiole measuring, in dorsal view, about .25 X as long as the hind tibia (Fig. 21).

Paratypes.—BRAZIL: 4 ♀♀, same data as type [MCZ]; 5 ♀♀, Seara, Santa Catarina, Jan. 1960 (Fritz Plaumann) [MCZ]; 11 ♀♀, Nova Teutonia, Santa Catarina (Fritz Plaumann [MCZ, USNM, BMNH, BSA]; 6 ♀♀, Ibicare, Santa Catarina, 600 meters elev., Sept. 1960 (Fritz Plaumann) [MCZ, ANSP]; 7 ♀♀, Erechim, Rio Grande do Sul, 750 meters elev., July, Aug. (Fritz Plaumann) [MCZ, BSA].

Variation—The 31 paratypes vary in size from 1.6 to 2.0 mm. In several of the larger specimens, the head, thorax, and petiole are dark castaneous, considerably darker than the appendages

and the abdomen. The number of eye facets varies from four to six. Some variation can be noted in the degree to which the sides of the head are convergent above and below, but in all specimens head length approximates 1.3-1.35 X head width. Maximum width of the propodeum varies from 1.3-1.5 X minimum width.

Remarks.—This species has the strongest propodeal constriction of any species of this genus known to me, fully as strong as it is in some species of *Apenesia*.

5. Genus PSEUDISOBRACHIUM Kieffer²

Isobrachium Ashmead, 1893, pp. 35-40 (U.S. spp.; not Foerster, 1856, misidentification). —Ashmead, 1902, p. 270.

Pseudisobrachium Kieffer, 1904b, p. 368 (type species *P. laticeps* Kieffer, designated by Kieffer, 1906a). —Kieffer, 1905a, pp. 101, 125. —Kieffer, 1906a, pp. 295-305 (key to spp. of Europe). —Kieffer, 1908a, pp. 23-24. —Kieffer, 1914, pp. 472-484 (key to spp. of world). —Benoit, 1957, pp. 26-28 (African spp.). —Evans, 1961, pp. 211-318 (spp. of North and Central America).

Monepyris Kieffer, 1905a, pp. 101, 124 (type species *Epyris holidayi* Westwood, monobasic; synonymy by Kieffer, 1906a).

Plutobethylus Kieffer, 1910b, p. 51 (type species *P. distans* Kieffer, original designation; synonymy by Evans, 1961).

Lyssepyris Kieffer, 1913, p. 108 (type species *Holepyris flavicornis* Kieffer, monobasic; synonymy by Evans, 1961).

Xantepyrus Kieffer, 1913, p. 108 (type species *Epyris flaviventris* Kieffer, monobasic; synonymy by Evans, 1961).

Lissepyris Kieffer, 1914, p. 236 (error for *Lyssepyris* Kieffer, 1913).

Xantepyrus Kieffer, 1914, p. 417 (correction of typographical error in name *Xantepyrus* Kieffer, 1913).

Parisobrachium Kieffer, 1914, p. 424 (type species *Rhabdepyris* (?) *albipes* Kieffer, monobasic; synonymy by Evans, 1961).

Generic characters.—*Males.* Maxillary palpi with six segments, labial with three. Mandibles with from three to five teeth, clypeus with a trapezoidal median lobe the apex of which is usually truncate, but may be emarginate or dentate (in several South American species the median lobe is rounded or subangulate, not trapezoidal); eyes densely covered with short hair (except glabrous in *coralis* Cameron, from Panama); antennae 13-segmented, filiform, the flagellar pubescence appressed

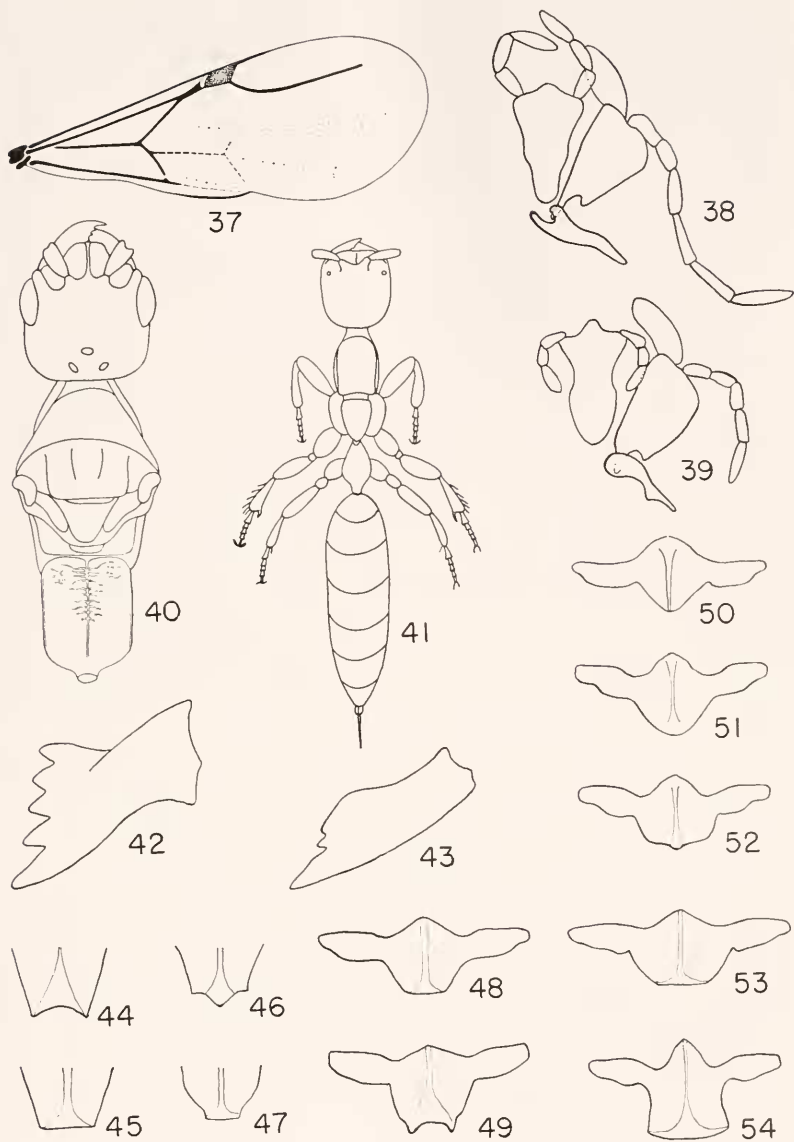
² In a paper received too late for incorporation into this synopsis, Ogioblin has described three new species of *Pseudisobrachium*, one of them forming the basis of a new subgenus (Ogioblin, 1963, Rev. Soc. Ent. Argentina, 26: 133-138). The three species were described from females from the provinces of Buenos Aires and Misiones, Argentina. They are: *P. (P.) rapoportii*, *P. (P.) solenopsiphilum*, and *P. (Edapholigon) hypogeum*. The subgenus *Edapholigon* agrees well with *Pseudisobrachium* in most characters, but the maxillary and labial palpi have a single segment each and the midventral carina on the head is distinct only on its anterior third.

or partially erect, never fully erect and bristling, but flagellum with sparse erect setulae which stand above the pubescence; occipital carina usually obsolete dorsally. Pronotum at most weakly rugulose and very weakly impressed along posterior margin, without a transverse carina anteriorly; notauli complete, incomplete, or even absent; scutellum with a transverse groove at base; propodeum with a median carina (rarely absent), without a well-defined basal triangle, commonly (but not always) without sublateral carinae and transverse carina; claws with a small, erect tooth (sometimes very small or even absent, sometimes large), base of claw subdentate (as in *Pristocera*) in a very few species. Fore wing with costal vein extending beyond stigma only slightly if at all; basal vein reaching subcosta well basad of stigma; discoidal vein partially or fully outlined or completely absent. Abdomen sessile (petiolate in one known species). Subgenital plate simple, with a relatively short basal stalk (highly specialized and deeply divided in two known species). Genitalia with the parameres deeply divided into two separate arms; inner margin of base of volsella with a vannus (rarely absent); aedeagus of relatively simple structure, generally flat and somewhat bottle-shaped, but in a few species compressed and with membranous areas on the ventral side.

Females. Maxillary palpi with five segments, labial with three. Mandibles with three or four teeth; clypeus truncate or emarginate apically; eyes each consisting of a single facet, sometimes indistinct; head longer than broad; antennae short, 13-segmented, slightly incrassate. Mesonotum subtriangular, elongate, somewhat pointed behind; propodeum gradually narrowed anteriorly to a pair of small points which embrace the posterior point of the mesonotum, the thorax much constricted at the junction of the propodeum and mesonotum; mesopleura large, bulging laterally; middle tibiae stout and with strong spines above. Abdomen sessile in all known species. (Figs. 37-62.)

Remarks.—The synonymy of several of Kieffer's genera with *Pseudisobrachium* was discussed by Evans (1961). It will be noted that exceptions can be found to most of the characters cited for the males. In spite of this, members of this genus have a characteristic habitus and can generally be placed with little difficulty. In cases of doubt, the parameres of the genitalia can be depended upon for reliable identification, for they are deeply divided in all *Pseudisobrachium*, but not at all so in other genera of this subfamily.

Pseudisobrachium spp. Fig. 37. *P. prolongatum* (Provancher), male, fore wing. Fig. 38. Labium and maxilla, same sp., male. Fig. 39. Labium and maxilla, same sp., female. Fig. 40. Head and thorax, same sp., male. Fig. 41. Female, same sp. Fig. 42. *P. haemorrhoidalis* (Westwood), mandible. Fig. 43. *P. argentanicum* n. name, mandible. Fig. 44. *P. boliviense* Kieffer, median lobe of clypeus. Fig. 45. *P. paraguayense* n. name, same. Fig. 46. *P. brasiliense* Kieffer, same. Fig. 47. *P. rufopictum* n. name, same. Fig. 48. *P. argentanicum* n. name, clypeus. Fig. 49. *P. coxalis* (Cameron), same. Fig. 50. *P. angulatum* n. sp., same. Fig. 51. *P. plau-manni* n. sp., same. Fig. 52. *P. distans* (Kieffer), same. Fig. 53. *P. pulcherrimum* n. sp., same. Fig. 54. *P. montivagum* n. sp., same.



Biology. — The males of this genus are often taken in sweepings from low vegetation in fields and open woods; many species are nocturnal, especially in arid and semiarid regions. In my revision of this genus (1961) I summarized data from many parts of the world which indicate that the females inhabit ant nests. I pointed out that the evidence suggested that they are parasites of ant larvae, even though most if not all other *Pristocerini* attack beetle larvae.

Since this time I have come to feel that these wasps more probably attack soil-dwelling (perhaps myrmecophilous) beetle larvae, as suggested long ago by Ashmead (1893). In May 1963 I took a female *P. prolongatum* (Provancher) at Lexington, Mass., under a rock with worker *Camponotus* and *Acanthomyops* (no brood of either ant could be found). I placed the *Pseudisobrachium* in a rearing tin with some soil and from time to time presented her with ant larvae of various sizes, including species of *Lasius* as well as the above genera. She not only failed to attack them but appeared to avoid them; when introduced into other tins containing worker ants, eggs, and larvae, she appeared to avoid the ants and was in turn avoided by them. Unfortunately, I was unable to locate any beetle larvae before she died one week later. Of course it is possible that this female had already laid her full complement of eggs (the abdomen was slightly transparent and appeared to show no evidence of eggs) or that some other factor was unfavorable.

Distribution. — Members of this genus occur in all zoogeographic regions except the Australian. In the Americas, the genus occurs trancontinentally in southern Canada, south through the United States, Central America, and the Greater and Lesser Antilles, to Peru, Bolivia, and central Argentina; no species occur in Chile so far as presently known. In the Old World, the genus is represented in the Palaearctic, Ethiopian, and Oriental regions, but in none of these regions does one find the rich multiplicity of species characteristic of the Americas. Two species have been described from the Philippines and several undescribed species occur there, but I have seen no specimens from any other of the Pacific Islands, including the East Indies and the entire Australian region.

Included American species:

United States

anomalum Evans, 1961, p. 311; ♂, Virginia (also New Jersey, Florida, Illinois).

- apache* Evans, 1961, p. 299; ♂, Arizona.
- ashmeadi* Evans, 1961, p. 275; ♂, District of Columbia (widely distributed in eastern U.S.) (♀ also described).
- carbonarium* (Ashmead), 1893, p. 59; ♂, District of Columbia (widely distributed in eastern U.S.) (♀ described by Evans, 1961).
- carolinianum* Evans, 1961, p. 254; ♂, South Carolina (also Florida).
- castaneum* Evans, 1961, p. 248; ♂, California.
- comanche* Evans, 1961, p. 298; ♂, Arizona (also Texas).
- crassum* Evans, 1961, p. 239; ♂, Texas.
- emarginatum* Evans, 1961, p. 303; ♂, Texas.
- flavinervis* Fouts, 1928, p. 123; ♂, California (Texas to California; northern Mexico) (♀ described by Evans, 1961).
- flaviventre* (Kieffer), 1904a, p. 526; ♂, Texas (widely distributed in eastern U.S.) (♀ described by Evans, 1961).
- foutsii* Evans, 1961, p. 300; ♂, Texas (Texas to California; northern Mexico).
- gibbosum* Evans, 1961, p. 255; ♂, New Mexico.
- krombeini* Evans, 1961, p. 287; ♂, New Mexico.
- macrops* Evans, 1961, p. 309; ♂, Texas.
- matthewsi* Evans, 1961, p. 249; ♂, Texas (♀ also described).
- minimum* Evans, 1961, p. 280; ♂, New Mexico (also Arizona).
- minutissimum* Evans, 1961, p. 281; ♂, Baja California (also Arizona, New Mexico, Morelos, Guatemala).
- navajo* Evans, 1961, p. 283; ♂, Arizona.
- obscurum* Evans, 1961, p. 258; ♂, Texas (also Arizona, northwest Mexico) (♀ also described).
- occidentale* Evans, 1961, p. 244; ♂, California (also Arizona) (♀ also described).
- otiosum* Evans, 1961, p. 256; ♂, Arizona.
- pallidum* Evans, 1961, p. 258; ♂, Arizona.
- paucipunctatum* Fouts, 1928, p. 122; ♀, Utah (also California).
- persimile* Evans, 1961, p. 284; ♂, California.
- prolongatum* (Provancher), 1881, p. 265; ♂, Quebec (widely distributed in southern Canada and northern

U.S.) (♀ described by Evans, 1961) (synonyms: *magnum* Ashmead, 1893, *myrmecophilum* Ashmead, 1893, *mandibulare* Ashmead, 1893, *montanum* Ashmead, 1893, *rugosulum* Fouts, 1928, *agilis* Whittaker, 1929).

pusillum Evans, 1961, p. 297; ♂, Louisiana (also Arkansas) (♀ also described).

rectangulatum Evans, 1961, p. 304; ♂, Texas (Nebraska to Nuevo Leon, Mexico).

rufiventre (Ashmead), 1893, p. 38; ♂, Virginia (widely distributed in eastern U.S.) (synonyms: *flavicoxis* Fouts, 1928, *puncticeps* Fouts, 1928).

texanum Evans, 1961, p. 240; ♂, Texas.

Mexico and Central America

aztecum Evans, 1961, p. 263; ♂, Morelos, Mexico.

blomi Evans, 1961, p. 235; ♂, Chiapas, Mexico (also Morelos).

brunneum Evans, 1961, p. 252; ♂, Hidalgo, Mexico.

clypeatum Evans, 1961, p. 242; ♂, Panama.

cooperi Evans, 1961, p. 241; ♂, Costa Rica.

costaricanum Evans, 1961, p. 317; ♀, Costa Rica.

coxalis (Cameron), 1888a, p. 450; ♂, Panama (re-described below, sp. 3) (new combination).

dalmati Evans, 1961, p. 237; ♂, Guatemala (also Mexico).

flavicornis (Kieffer), 1906b, p. 246; ♂, Nicaragua (also Honduras).

gigas Evans, 1961, p. 314; ♀, Panama.

hurdi Evans, 1961, p. 286; ♂, Durango, Mexico.

manni Evans, 1961, p. 315; ♀, Guatemala.

micheneri Evans, 1961, p. 234; ♂, Puebla, Mexico.

michoacanum Evans, 1961, p. 254; ♂, Michoacan, Mexico.

montivagum Evans, n. sp. described below from ♂, Guerrero, Mexico (sp. 1).

nigriculum Evans, 1961, p. 251; ♂, Hidalgo, Mexico (also Zacatecas).

perpunctatum Evans, 1961, p. 237; ♂, Oaxaca, Mexico.

petiolatum Evans, 1961, p. 310; ♂, Panama.

pulcherrimum Evans, n. sp. described below from ♂, Costa Rica (sp. 2).

rettenmeyeri Evans, 1961, p. 240; ♂, Panama (also Costa Rica).

superbum Evans, 1961, p. 313; ♂, Panama.

testaceipes Kieffer, 1906b, p. 240; ♂, Nicaragua.
zeteki Evans, 1961, p. 315; ♀, Panama.

West Indies.—I have seen representatives of this genus from all of the islands of the Great Antilles, and several species occur on St. Vincent, at least, in the Lesser Antilles. Up to the present time only the following three species have been described:

albipes (Ashmead), 1894, p. 191; ♂, St. Vincent.
collinum (Ashmead), 1894, p. 190; ♂, St. Vincent.
terresi Mann, 1915, p. 164; ♀, Haiti.

South America.—Relatively few (23) of the many South American species of this genus have been described. I have described below several species which are of note because they present certain exceptional structural features. I have also presented notes on several of the described species.

angulatum Evans, n. sp. described below from ♂, Peru (sp. 14).

argentinum Evans, new name for *flaviventris* (Kieffer), 1910b, p. 53 (*nec* Kieffer, 1904a); ♂, Argentina (redescribed below, sp. 9).

bolivense Kieffer, 1910b, p. 45; ♂, Bolivia (redescribed below, sp. 11).

brasiliense Kieffer, 1910a, p. 294; ♂, Brazil (redescribed below, sp. 8).

burchellianum (Westwood), 1874, p. 165; ♂, Brazil (new combination).

crassicornis (Westwood), 1874, p. 164; ♂, Brazil (redescribed below, sp. 6) (new combination).

distans (Kieffer), 1910b, p. 51; ♂, Peru (redescribed below, sp. 10) (new combination).

distinguendum Kieffer, 1904b, p. 369; ♀, Paraguay.

elegantulum Ogloblin, 1925b, p. 24; ♂, Brazil.

graciliventre Ogloblin, 1925b, p. 27, new name for *distinguendum* Ogloblin, 1925a, *nec* Kieffer 1904b; ♀, Brazil.

haemorrhoidalis (Westwood), 1874, p. 166; ♂, Brazil (redescribed below, sp. 5) (new combination).

haywardi Ogloblin, 1950, p. 490; ♀, Argentina.

inchoatum Kieffer, 1910a, p. 293; ♂, Brazil.

laticeps Kieffer, 1904b, p. 368; ♀, Bolivia.

merklei Bruch, 1917b, p. 464; ♀, Argentina.

mrazi Ogloblin, 1925a, p. 79; ♀, Brazil.

ogloblini Evans, new name for *flaviventre* Ogloblin, 1925a, nec Kieffer, 1904a; ♀, Brazil.

optimum Evans, n. sp. described below from ♂, Brazil (sp. 4).

paraguayense Evans, new name for *albipes* (Kieffer), 1904b, p. 411, nec Ashmead, 1894; ♂, Paraguay (re-described below, sp. 12).

plaumanni Evans, n. sp. described below from ♂, Brazil (sp. 13).

rufopictum Evans, new name for *rufiventris* (Kieffer), 1910a, p. 291 nec Ashmead 1893; ♂, Brazil (re-described below, sp. 7).

solenopsidicola Bruch, 1917a, p. 143; ♂, Argentina.

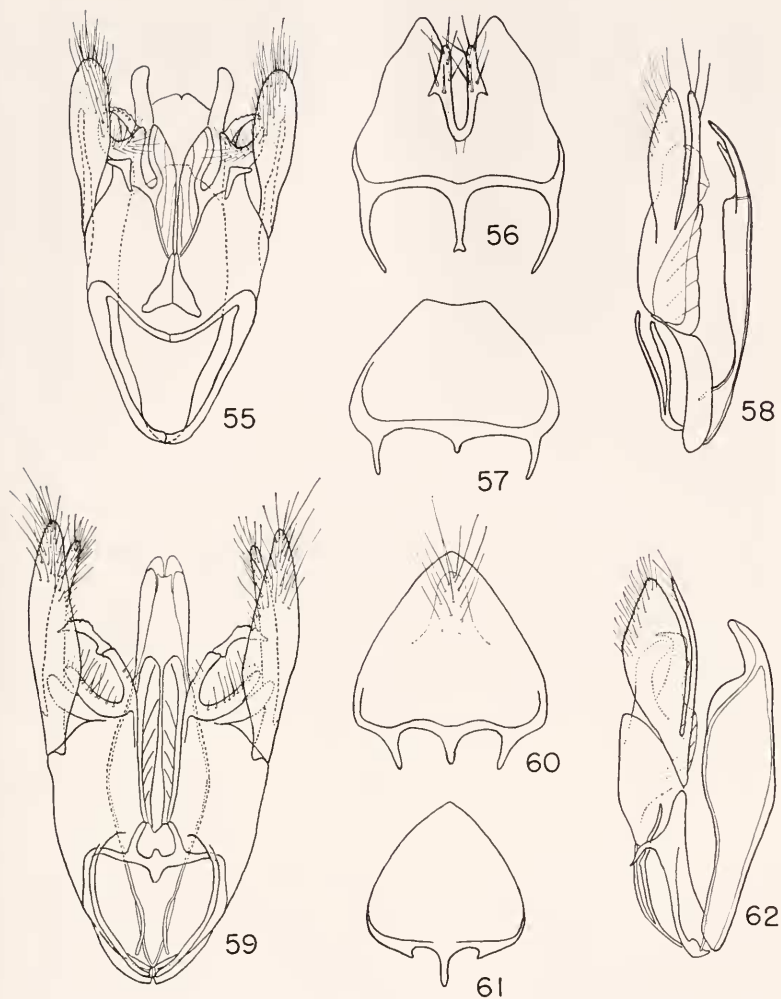
uruguayense Ogloblin, 1938, p. 41; ♂, Uruguay.

(1) PSEUDISOBRACHIUM MONTIVAGUM new species

Holotype.—♂, MEXICO: GUERRERO: Omilteme, 8000 feet, Aug. (H. H. Smith) [BMNH].

Description of type.—Length 4.4 mm; LFW 4.0 mm. Head and thorax black; abdomen dark castaneous except first tergite blackish, all tergites indistinctly banded with light brown apically; apical half of mandibles yellowish brown, teeth rufous; antennae wholly medium castaneous except scape weakly infuscated; front trochanters and middle and hind coxae and trochanters bright testaceous, legs otherwise light brown; wings subhyaline, veins and stigma brown. Mandibles with five teeth in an oblique series. Median lobe of clypeus unusually broad and long, sides straight and parallel, apical margin weakly convex (Fig. 54); median line strongly carinate. Antennae very long, first four segments in a ratio of about 30:6:27:22, segment three 2.7 X as long as thick, segment eleven 3.2 X as long as thick, flagellum with subappressed, fairly coarse pubescence and with numerous erect setae standing well above it. Front polished, non-alutaceous, punctures separated, on the average, by about their own diameters. Eyes strongly hairy; occipital carina complete. WF .65 X WH, 1.5 X HE; distance from eye tops to vertex crest subequal to HE. Ocelli small, in a compact, right triangle; OOL 1.9 X WOT.

Pronotum crossed by some indistinct transverse ridges, its surface, like that of the mesoscutum, shining and closely punctate; notauli strong but not quite reaching anterior or posterior



Pseudisobrachium spp., male terminalia. Fig. 55. *P. optimum* n. sp., genitalia. Fig. 56. Same sp., subgenital plate. Fig. 57. *P. plaumanni* n. sp., subgenital plate. Fig. 58. Same sp., genitalia, lateral view. Fig. 59. *P. montivagum* n. sp., genitalia. Fig. 60. Same sp., subgenital plate. Fig. 61. *P. pulcherrimum* n. sp., subgenital plate. Fig. 62. *P. coxalis* (Cameron), genitalia, lateral view.

margins of mesoscutum. Propodeum elongate, measuring 1.8 X as long as wide, in lateral view 2.4 X as long as high; disc with a number of weak, irregular carinae paralleling the strong median carina, not at all margined behind. Mesopleurum polished, non-alutaceous, punctate except on the callus. Fore wing with the discoidal vein pigmented for a distance greater than length of basal vein, nearly interstitial with median vein. Abdomen slender and elongate. Subgenital plate subtriangular, with three basal stalks rather close together, apex rounded (Fig. 60). Genitalia as shown in Fig. 59.

Paratype. — ♂, MEXICO: GUERRERO: Chilpancingo, 4000 feet, Sept. (H. H. Smith) [MCZ].

Variation. — The paratype is slightly smaller than the type (LFW 3.6 mm) and differs in color only in that the coxae and trochanters are light brown like the rest of the legs. The eyes are smaller than in the type (WF 1.6 X HE), the vertex distinctly more narrowly rounded than in that specimen. Otherwise the resemblance to the type is very close.

Remarks. — This species is unusual because of the complete occipital carina and the large, subrectangular median lobe of the clypeus. It will run to the *occidentale* group in my revision of this genus, and agrees fairly well in general features with members of that group. However, all the members of that group have the occipital carina obsolete dorsally and the clypeus much smaller and with more oblique sides.

(2) PSEUDISOBRACHIUM PULCHERRIMUM new species

Holotype. — ♂, COSTA RICA: Turrialba, 17 June 1949 (K. W. Cooper) [USNM, No. 64,995].

Description of type. — Length 8 mm; LFW 5.2 mm. Head black except mandibles and clypeus largely ferruginous; pronotum black except collar, lower sides, and broad posterior margin ferruginous; mesoscutum ferruginous except black on extreme sides, along notauli, and between the notauli on posterior third; scutellum piceous; metanotum dull ferruginous; propodeum black; mesopleurum piceous except ferruginous on the callus and in a band anterior to middle coxae; basal three abdominal tergites blackish except for orange-brown apical bands, remainder of abdomen bright orange-brown; palpi and tegulae testaceous; antennae uniformly light rufo-castaneous; front coxae piceous, other coxae and all the femora suffused with brown; hind tibiae brown except yellowish brown on apical fifth;

remaining tibiae light brown, tarsi yellowish brown. Fore wing subhyaline, with a rather strong brownish cloud in and just below the marginal cell; hind wing hyaline; veins and stigma dark brown. Body setae dense, short, golden. Mandibles with five teeth, basal three teeth rounded, fifth tooth slightly larger than third and fourth. Clypeus with a broad median lobe, the sides of which are rounded, the apex subtruncate (Fig. 53); median carina arched in profile. First four antennal segments in a ratio of about 26:5:16:16, segment three 2.2 X as long as thick, segment eleven 2.8 X as long as thick; flagellar pubescence rather fine, subappressed, much exceeded by sparse, erect setae. Front polished, non-alutaceous, covered with small but sharply defined punctures which are separated for the most part by less than their own diameters. Eyes strongly hairy; occipital carina obsolete dorsally. WF .68 X WH, 1.50 X HE; vertex broadly rounded off, distance from eye tops to vertex crest nearly equal to HE. Ocelli in a compact triangle far removed from eyes; OOL 1.8 X WOT; posterior ocelli removed from vertex crest by a distance slightly less than WOT.

Pronotum shining, transversely striato-punctate. Mesoscutum polished, densely covered with small punctures except for a smooth area anteromedially; notauli strong on anterior .7 of scutum, absent behind; scutellar disc with a median impunctate streak. Propodeum 1.3 X as long as wide, the dorsal surface about as long as wide, indistinctly margined behind; median carina distinct, disc otherwise covered with rather strong reticulations; declivity and side-pieces striate. Mesopleurum closely punctate except for the callus, which is prominent and strongly polished. Claws with a sharp erect tooth. Fore wing with the discoidal vein interstitial with the median vein, discoidal cell fully outlined, subdiscoidal vein weakly pigmented almost to wing margin, first recurrent vein also weakly pigmented. Subgenital plate subtriangular, its apex rounded, median basal stalk longer than lateral stalks (Fig. 61). Genitalia of typical form for the genus, the dorsal arms of the parameres fairly wide and nearly as long as the ventral arms; aedoeagus simple.

Remarks. — This striking species is a member of the *crassum* species-group and will run to *dalmati* in my key (Evans, 1961). It differs from *dalmati* in the much longer antennae, the broader and more rounded median lobe of the clypeus, the rufous coloration on the clypeus, parts of the thorax, and the apical half of the abdomen, and in the diffuse brown spot on the outer part of the fore wing.

(3) PSEUDISOBRACHIUM COXALIS (Cameron) new combination

Epyris coxalis Cameron, 1888a, p. 450 [Type: ♂, PANAMA: Bugaba (G. C. Champion) (BMNH)].

Pristocera coxalis Kieffer, 1908a, p. 22. — Kieffer, 1914, p. 468.

Plesiotype. — ♂, PANAMA: Barro Colorado Island, Canal Zone, 18 July 1956 (C. W. & M. E. Rettenmeyer) [KU].³

Description of plesiotype. — Length 8 mm; LFW 5.4 mm. Body shining black except abdomen weakly suffused with brownish basally and apically; palpi light brown, mandibles wholly straw-colored except teeth rufous; scape black, flagellum dark brown, all coxae and trochanters, and basal fourth of all femora, light straw-colored, legs otherwise dark brown; wings lightly tinged with brownish, veins and stigma dark brown. Body setae grayish. Mandibles broad apically, with four very strong teeth and no evidence of a fifth tooth. Clypeus with a strong, somewhat trapezoidal median lobe, its sides weakly notched subapically, the apex with two strong teeth between which it is arcuately concave (Fig. 49). First four antennal segments in a ratio of about 24:5:16:15, third segment twice as long as thick, segment eleven 2.6 X as long as thick; pubescence dark, subappressed, flagellum also with numerous prominent erect setae on under side. Front polished, non-alutaceous, punctures small but sharply defined, separated by 1-2 X their own diameters. Eyes with only minute, barely noticeable setae; occipital carina complete. Head about as wide as high; inner orbits slightly closer together near bottom than at middle; WF .61 X WH, 1.30 X HE; vertex very broadly rounded, distance from eye tops to vertex crest equal to about .7 X HE. Ocelli small, in a compact triangle, front angle less than a right angle; OOL 1.35 X WOT; distance from hind ocelli to vertex crest slightly greater than WOT.

Pronotal disc rather flat, with a vague indication of a transverse impression; surface polished and with well spaced small punctures. Mesoscutum polished, sparsely punctate; notauli strong on anterior .8 of scutum; scutellar disc impunctate in the center. Propodeum 1.15 X as long as wide, the disc 1.2 X as wide as long; median carina strong except obsolescent behind, barely reaching the strong transverse carina; basal triangle with weak, irregular longitudinal carinae, remainder of disc shining

³I have studied the type of this species, but it is badly broken and various parts glued to a card. I therefore prefer to base my description on a specimen compared with the type and found to resemble it very closely.

and with only very weak sculpturing; declivity with fine transverse striations, side-pieces nearly smooth. Mesopleural callus large, convex, polished, subtended by a curving, punctate groove; remainder of mesopleurum sparsely punctate. Claws strongly curved, the inner ray slightly larger than the outer ray and subparallel to it. Fore wing with costa continued beyond stigma for a distance about equal to length of stigma; discoidal vein strong, interstitial with median vein; discoidal cell fully outlined, subdiscoidal vein weakly pigmented almost to wing margin; first recurrent vein and outer part of cubital vein weakly pigmented. Subgenital plate triangularly produced medially with three short, widely separated stalks. Genitalia rather typical of the genus; dorsal arms of parameres narrower than ventral arms but just as long; aedoeagus compressed, its apex somewhat hooked; vannus well developed (Fig. 62).

Other males examined.— PANAMA: 1, same data as plesio-type [MCZ]; 1, Porto Bello, 23 Feb. 1911 (A. Busck) [USNM].

Variation.— The Porto Bello specimen shows some striking color differences from the type and the two Barro Colorado specimens; the first two antennal segments are straw-colored, and the femora are straw-colored except at their extreme tips. In this specimen the sides of the median lobe of the clypeus are more strongly sinuate, almost angulate, and the apical teeth are longer. The available specimens show no important differences in size or in standard measurements.

Remarks.— This species was omitted from my 1961 treatment of the genus because I was unaware that it belonged in *Pseudisobrachium*. Indeed, until I studied the genitalia I was inclined to regard the species as an aberrant *Apenesia*, even though the clypeus was more *Pseudisobrachium*-like. The nearly glabrous eyes, the strongly margined and weakly sculptured propodeal disc, and the complete occipital carina all suggest *Apenesia*, and the costa is continuous beyond the stigma as in that genus. Nevertheless, the genitalia and subgenital plate indicate conclusively that this is an aberrant *Pseudisobrachium*.

(4) PSEUDISOBRACHIUM OPTIMUM new species

Holotype.— ♂, BRAZIL: Nova Teutonia, Santa Catarina, 7 Nov. 1944 (Fritz Plaumann) [AMNH].

Description of type.— Length 8.0 mm; LFW 6.0 mm. Head black; thorax black except pronotum tinged with dull ferruginous on all margins; basal four abdominal segments, and basal

third of fifth, piceous, remainder of abdomen bright ferruginous; apical half of mandibles dull ferruginous; antennae wholly castaneous except apical four segments somewhat infuscated; tegulae testaceous; legs bright yellowish brown except all coxae moderately infuscated. Fore wings strongly tinged with yellowish on basal half, the setulae golden; then with a broad fuscous band extending from stigma and marginal cell to posterior wing margin, the setulae here dark; apex of wing subhyaline, with golden setulae; hind wing weakly tinged with yellowish on basal half, apical half weakly infuscated. Body covered with rather dense, short, golden setae. Mandibles broad apically, with five strong teeth in almost a straight line. Clypeus with a strong median lobe the sides of which are somewhat rounded, the apex subtruncate, slightly reflexed upward; median line carinate basally. Eyes moderately hairy, occipital carina present but obsolescent dorsally. First four antennal segments in a ratio of about 11:3:5:5, segment three 2.2 X as long as thick, segment eleven 2.4 X as long as thick; pubescence coarse, semi-erect, flagellum also with some fully erect setae which stand well above the pubescence and are nearly as long as the width of the flagellum. Front shining, non-alutaceous, punctures small but sharply defined, separated for the most part by 1-2 X their own diameters. Head very slightly higher than wide, WH .98 X LH; front broad, WF .65 X WH, 1.4 X HE; vertex very broadly rounded off, distance from eye tops to vertex crest equal to about two-thirds HE. Ocelli in a compact triangle, the front angle slightly less than a right angle; OOL 1.25 X WOT; posterior ocelli removed from vertex crest by a distance slightly greater than WOT.

Pronotal disc short, finely transversely striate, depressed just before posterior margin. Mesoscutum polished, punctures small but strong, irregularly, fairly closely spaced; notauli strong except absent on posterior fifth; scutellar disc wholly punctate. Propodeum about 1.1 X as long as wide, the disc about 1.2 X as wide as long; lateral and transverse carinae distinct, median carina moderately distinct but not quite reaching transverse carina; disc and declivity wholly roughened by reticulate sculpturing; side-pieces in large part smooth and polished. Mesopleura with the callus large, strongly polished, impunctate, subtended by a broad, striate groove; remainder of mesopleurum covered with evenly spaced punctures. Claws with a strong erect tooth and also subdentate basally. Fore wing with discoidal cell

weakly outlined by pigmented lines, first recurrent vein weakly pigmented and subdiscoidal vein weakly continuous to outer wing margin; costa extended as a weak vein far beyond stigma. Abdomen sessile. Subgenital plate with a deep median cleft and with a pair of setose, fingerlike processes beside the cleft (Fig. 56). Genitalia with the ventral arms of the parameres very much broader and longer than the dorsal arms; volsellae with the vannus produced into an apical, knob-like expansion; aedoeagus with a pair of lateral lobes which extend well beyond the main body of the aedoeagus (Fig. 55).

Paratypes. — BRAZIL: 5 ♂♂, all same data as type except various dates in January and February, 1945-46 [BMNH, MCZ, HKT].

Variation. — LFW varies from 6.0 to 7.0 mm. In the larger specimens the vertex is somewhat more strongly produced behind the eyes, the posterior ocelli being removed from the vertex crest by as much as 1.3 X WOT. OOL varies from 1.1 to 1.3 X WOT, but other head measurements show little variation. In all of the paratypes the median carina of the propodeum reaches the transverse carina.

Remarks. — The subgenital plate of this species is uniquely modified. It is not unlike that of *Pristocera sensu stricto* (which is confined to the Old World), but the finger-like processes flanking the emargination are absent in *Pristocera*. The apical prolongation of the vannus of the genitalia is also unusual. Nevertheless, in most other respects the species is a typical *Pseudisobrachium*, and I see nothing to be gained by erecting a new generic or subgeneric name for it because of specializations of the terminalia.

(5) PSEUDISOBRACHIUM HAEMORRHOIDALIS (Westwood) new combination

Pristocera haemorrhoidalis Westwood, 1874, p. 166, pl. XXX, fig. 7 [Type: ♂, BRAZIL (Guérin-Méneville) (no further data) (HCOU)]. — Kieffer, 1914, p. 469.

Description of type. — Length 9.5 mm; LFW 6.9 mm. Head and thorax black; basal three segments of abdomen dark brown, remainder of abdomen bright rufo-castaneous; mandibles blackish except apical third rufo-castaneous; clypeus pale castaneous; scape medium brown, flagellum pale castaneous except apical few segments weakly infuscated; legs dark brown except front tarsi and apical half of front tibiae pale castaneous; wings

lightly tinged with brownish, fore wing with a very strong, broad brown band beginning at stigma and basal half of radial cell and extending to posterior margin of wing. Mandibles broad apically, with five strong teeth in an oblique series (Fig. 42). Clypeus with a prominent, trapezoidal medial lobe with a broadly V-shaped apical emargination, such that the sides are angularly produced. First four antennal segments in a ratio of about 27:6:15:12, segment three and segment eleven each about 3 X as long as thick; pubescence coarse, semi-erect. Front polished, non-alutaceous, punctures of moderate size, rather crowded medially but more widely spaced laterally and above. Eyes moderately hairy; occipital carina obsolete dorsally. Head about as wide as high; WF .64 X WH, 1.37 X HE; vertex broadly rounded off far above eye tops, distance from eye tops to vertex crest nearly equal to HE. Ocelli small, in a compact triangle far removed from eyes; OOL 1.65 X WOT.

Pronotum short, disc weakly transversely rugulose, just before the posterior margin depressed, smooth, and polished. Propodeal disc very short, 1.4 X as wide as long, margined behind by a carina which is curved forward and obsolete medially; median carina strong, disc otherwise with irregular reticulations, dull. Mesopleural callus strong, polished, with a few punctures, sharply margined below, subtended by a broad, foveolate groove; rest of mesopleurum strongly punctate. Claws strongly dentate. Fore wing with discoidal cell outlined by pigmented lines, discoidal vein strong at base, interstitial with median vein; costa extended beyond stigma by a distance slightly greater than length of stigma. Abdomen slender, sessile [dirty and somewhat damaged apically; possibly the subgenital plate is deeply cleft as in the preceding species].

Remarks.— I have seen no specimens of this species other than the type. The clypeus differs in shape and color from the otherwise rather similar *optimum*, and the antennae are longer and the legs darker than in that species.

(6) PSEUDISOBRACHIUM CRASSICORNIS (Westwood) new combination

Pristocera crassicornis Westwood, 1874, p. 164, pl. XXIX, fig. 6 [Type: ♂, BRAZIL: Amazonas (H. W. Bates) (HCOU)]. —Kieffer, 1914, p. 470.

Description of type.— Length 8 mm; LFW 5 mm. Body entirely black; mandibles black, rufous apically, scape black, flagellum dark brown; legs dark brown except tarsi medium brown,

middle and hind trochanters yellowish brown; wings subhyaline, fore wing suffused with brownish anteriorly, especially in and below marginal cell. Mandibles large, their lower margin unusually straight, apex with five teeth. Clypeus with a narrow median lobe which terminates in two sharp teeth, between which the margin is arcuately concave (as figured for *coxalis* except sides of median lobe straighter). First four antennal segments in a ratio of about 25:5:13:11, segment three 1.6 X as long as thick, segment eleven 1.9 X as long as thick; pubescence brownish, subappressed, rather coarse, erect setae numerous, especially on under sides of basal segments. Front shining, non-alutaceous, extremely closely punctate, punctures strong and separated for the most part by much less than their own diameters. Eyes hairy; occipital carina complete. WH .90 X LH; WF .63 X WH, 1.27 X HE. Ocelli small, front angle of ocellar triangle less than a right angle; OOL 1.5 X WOT. Vertex broadly rounded off far above eye tops, distance from eye tops to vertex crest equal to about two-thirds X HE.

Pronotum rather long, with smooth contours; disc shining, non-alutaceous, punctures large, separated by about their own diameters. Mesoscutum polished, punctures strong, crowded along notauli but elsewhere rather sparse; notauli strong, not quite reaching posterior margin of scutum; scutellar disc weakly punctate. Propodeal disc 1.15 X as wide as long, declivity abrupt and steep, but not margined by a carina; disc with about 10 rather weak longitudinal carinae arising from base, behind and beside the longitudinal carinae wholly covered with arching striations. Mesopleural callus very large, convex, impunctate; remainder of mesopleurum with large punctures. Claws dentate. Fore wing with discoidal vein interstitial with median vein, weakly pigmented, discoidal cell faintly outlined; costa not extended beyond stigma. Abdomen slender, sessile. Terminalia not studied.

Remarks. — The two-pronged clypeus of this species is similar to that of the otherwise unrelated species *coxalis* (Cameron). Several other undescribed South American species also have a clypeus of this type and appear closely related to *crassicornis*.

(7) PSEUDISOBRACHIUM RUFOPICTUM new name

Pristocera rufiventris Kieffer, 1910a, p. 291 [Type: ♂, BRAZIL: Pará (C. F. Baker) (Pomona Coll., Claremont, Calif.)]. Preoccupied in *Pseudisobrachium* by Ashmead, 1893, p. 38. —Kieffer, 1914, p. 468.

Description of type.—Length 7 mm; LFW 4.5 mm. Head black; thorax piceous except pronotum ferruginous, somewhat infuscated medially; abdomen bright, pale rufo-castaneous except first tergite infuscated medially; mandibles yellowish brown, teeth rufous; clypeus deep amber, bordered with black; scape clear yellowish brown, flagellum dull castaneous, somewhat darker apically than basally; legs, including coxae, wholly bright yellowish brown; membrane of fore wing distinctly tinged with brownish below the stigma and marginal cell, veins and stigma brown. Mandibles broad apically, with five strong, subequal teeth in almost a straight line (much as in *haemorrhoidalis*, Fig. 42). Clypeus with a narrowly truncate apical margin, sides strongly oblique (Fig. 47); median carina very strong, in profile elevated in a strong arch. Antennae elongate, first four segments in a ratio of about 21:14:17:12, segment three unusually long, about 3.5 X as long as thick, segment eleven 2.5 X as long as thick; flagellar pubescence very coarse, semi-erect, erect setae also numerous, some of them nearly as long as thickness of segments bearing them. Front strongly polished, non-alutaceous, punctures small but deep and well-defined, separated by approximately their own diameters; punctures of vertex somewhat weaker; occipital carina strong below but obsolete dorsally. Eyes strongly hairy, strongly bulging from sides of head, WH 1.07 X LH. Front very narrow, WF .6 X WH, 1.0 X HE; ocelli slightly enlarged, DAO .20 X WF; ocellar triangle very compact, the ocelli separated by much less than their own diameters, front angle less than a right angle; OOL .9 X WOT. Vertex elevated above eye tops a distance equal to slightly more than half HE; top of vertex straight.

Pronotal disc short, with smooth contours but with some small but distinct transverse rugae. Mesoscutum polished, non-alutaceous, punctate about like the front; notauli strong on anterior .9 of mesoscutum; scutellum with basal groove rather wide, disc barely punctate. Propodeum 1.4 X as long as wide, disc with rather strong sculpturing, with lateral, sublateral and median carinae strong, some strong reticulations between the median and sublateral carinae, on the posterior part with strong but somewhat irregular transverse rugae, the one on the edge of the declivity stronger than the others and thus indistinctly margining the disc behind. Mesopleurum with the callus strongly convex, its central area shining, impunctate and non-alutaceous; remainder of mesopleurum non-alutaceous, punctures large, shallow, separated by about or less than their own diameters. Fore

wing with the discoidal vein pigmented to about the length of the basal vein, lower and outer sides of discoidal cell also weakly outlined. Claws strongly dentate. Terminalia not studied.

Remarks.—The mandibles of this species are much like those of *micheneri* Evans, described from Mexico, and the sculpturing, particularly the strong and nearly complete notauli, also suggests that species. In color, this species is similar to *Apenesia fulvicollis* (Westwood), also described from northern Brazil.

(8) PSEUDISOBRACHIUM BRASILIENSE Kieffer

Pseudisobrachium brasiliense Kieffer, 1910a, pp. 294-295 [Type: ♂, BRAZIL: Pará (C. F. Baker) (Pomona Coll., Claremont, Calif.)]. —Kieffer, 1914, pp. 481-482.

Description of type.—Length 3.8 mm; LFW 2.8 mm. Head and thorax black, abdomen dark brown, paler on sides of basal segments; mandibles wholly yellowish brown except teeth dark rufous; scape and base of flagellum straw-colored, flagellum infuscated beyond basal two segments, in greater part dull brownish; front coxae black but legs otherwise wholly bright straw-colored; wings subhyaline, with dark setulae, veins and stigma brown. Mandibles with five teeth, basal three teeth subequal, somewhat rounded. Apical margin of clypeus with a median, polished swelling which projects as a large, rounded tooth (Fig. 46); in profile the median ridge is straight and even, then elevated at the apical swelling. First four antennal segments in a ratio of about 34:7:20:18, segment three 2.2 X as long as thick, segment eleven twice as long as thick; flagellar pubescence coarse, suberect, erect setae also numerous and prominent. Front uniformly alutaceous, moderately shining, punctures small and shallow but very numerous, separated for the most part by about their own diameters; occipital carina obsolete dorsally; eyes strongly hairy. Head slightly higher than wide, WH .92 X LH; WF .67 X WH, 1.36 X HE; vertex extended far above eye tops, distance from eye tops to vertex crest subequal to HE, top of vertex nearly straight. Ocelli small, DAO .12 X WF, anterior ocellus far above line drawn between tops of eyes, ocellar triangle very compact, front angle less than a right angle; OOL 1.8 X WOT.

Pronotal disc rather flat, strongly alutaceous, punctures numerous but weak. Mesoscutum alutaceous, moderately shining, punctured about like front; notauli impressed narrowly but reasonably strongly on anterior .3 of scutum; center of scutellar disc shining, impunctate and non-alutaceous. Propodeal disc

1.4 X as long as wide, with well developed lateral, sublateral, and median carinae, disc otherwise with uniform but rather weak sculpturing which shows some tendency to form irregular transverse striae. Mesopleurum with callus large, convex, shining and wholly impunctate and non-alutaceous; remainder of mesopleurum alutaceous and with moderately strong, close punctures. Fore wing with the discoidal vein strong, perfectly interstitial with media, as long as basal vein and in fact discoidal cell wholly weakly outlined. Terminalia not studied.

Remarks. — This species is known to me only from the type. The clypeus is similar to that of *cooperi*, described from Costa Rica.

(9) PSEUDISOBRACHIUM ARGENTINICUM new name

Plutobethylus flaviventris Kieffer, 1910b, p. 53 [Type: ♂, ARGENTINA: Mendoza, 1906 (J. Haarup) (Berlin Museum, No. 206)]. Preoccupied in *Pseudisobrachium* by Kieffer, 1904a, p. 526. —Kieffer, 1914, p. 489.

Description of type. — Length 4.5 mm, LFW 4.1 mm. Head and thorax piceous, abdomen pale rufo-castaneous except center of first tergite infuscated; mandibles and scape light yellowish brown, flagellum dull, pale castaneous; tegulae testaceous; front coxae dark brown, but legs otherwise straw-colored; wings hyaline, stigma brown, veins amber, setulae on wing membrane very light brown. Mandibles with three teeth, the innermost tooth ill-defined, arching into inner mandibular margin (Fig. 43). Median lobe of clypeus narrowly subtruncate (actually very weakly convex), tectiform, median ridge straight in profile (Fig. 48). First four antennal segments in a ratio of about 33:8:15:13, segment three 1.8 X as long as thick, segment eleven 1.4 X as long as thick; flagellar pubescence pale, subappressed, erect setae fairly numerous. Eyes hairy. Front and vertex uniformly rather strongly alutaceous, weakly shining, punctures numerous but so shallow as to be scarcely noticeable. Head about as broad as high, vertex broadly rounded off a distance above the eye tops equal to about .7 X HE. Front rather narrow, WF .61 X WH, 1.17 X HE; ocelli large, DAO .24 X WF; OOL .62 X WOT. Occipital carina obsolete dorsally.

Pronotal disc alutaceous, closely but weakly punctate. Mesoscutum alutaceous, moderately shining, obscurely punctate; notauli distinct on anterior half; scutellum smooth and shining medially, basal groove narrow but deep, lateral foveae distinct. Propodeum rather long, 1.65 X as long as wide, in lateral view

2.25 X as long as high; median carina strong, reaching nearly to edge of declivity, disc otherwise alutaceous, less strongly so behind. Mesopleurum with callus large, biconvex, shining and only rather obscurely alutaceous; posterior portion of mesopleurum, below and behind callus, also shining, but anterior portion dull, alutaceous, and with distinct punctures. Legs with abundant short, whitish, subappressed hairs; claws weakly dentate. Fore wing with discoidal vein arising at junction of basal and transverse median veins, very weakly pigmented to about the length of the basal vein. Abdomen setose, more strongly so apically. Subgenital plate rounded apically. Genitalia not studied.

Remarks. — This species is known to me only from the type. I would judge it to be nocturnal.

(10) PSEUDISOBRACHIUM DISTANS (Kieffer) new combination

Plutobethylus distans Kieffer, 1910b, p. 51 [Type: ♂, PERU: Cosnipata-Ebene, Dept. Cuzco, 1000 meters elev., 3-12-1900 (Garlepp) (Berlin Museum, No. 201)]. —Kieffer, 1914, p. 488.

Description of type. — Length 4.1 mm; LFW 3.3 mm. Head black, thorax piceous, abdomen reddish brown, slightly paler basally and apically; mandibles yellowish, the teeth rufous; first two antennal segments yellow, remainder dull reddish brown; tegulae castaneous; legs, including coxae, bright yellowish brown; fore wing faintly infuscated, veins and stigma brown. Mandibles with five teeth, the basal three rounded, basal tooth slightly thicker than third and fourth teeth. Median apical margin of clypeus subtruncate, with a weak median tooth (Fig. 52). Antennae with the first four segments in a ratio of about 25:5:13:11, segment three 2.5 X as long as thick, segment eleven 1.9 X as long as thick; flagellum roughly pubescent, setulae suberect, some of them half as long as thickness of flagellum, erect setae fairly numerous. Front strongly alutaceous, only weakly shining, punctures shallow and inconspicuous. WF .69 X WH, 1.42 X HE; ocelli small, in a small triangle, the front angle acute; OOL 1.56 X WOT; posterior ocelli removed from vertex crest by a distance slightly less than WOT. Vertex broadly rounded off well above the eye-tops, distance from tops of eyes to vertex crest equal to about .8 X HE.

Pronotum short, weakly impressed medially, surface strongly alutaceous, weakly punctate. Mesoscutum also strongly alutaceous, punctures numerous but very shallow; notauli impressed

only on anterior .3; scutellar disc entirely alutaceous. Propodeum about 1.5 X as long as wide; median carina long, disc otherwise weakly shining and with numerous weak, irregular transverse rugae. Mesopleurum with callus moderately shining, weakly alutaceous, remainder of mesopleurum strongly alutaceous and with large, shallow punctures. Claws simple. Fore wing with discoidal vein arising slightly below top of transverse median vein, pigmented for a distance about equal to length of basal vein. Subgenital plate truncate apically. Genitalia not studied.

(11) PSEUDISOBRACHIUM BOLIVIENSE Kieffer

Pseudisobrachium boliviense Kieffer, 1910b, p. 45 [Type: ♂ BOLIVIA: Mapi (Staudinger) (Berlin Museum, No. 186)]. —Kieffer, 1914, pp. 482-483.

Description of type. — Length 5.8 mm; LFW 3.7 mm. Head and thorax black, abdomen piceous, sides of first tergite light brown; apical half of mandibles yellowish, the teeth rufous; scape black except its apical .2 light brown like the pedicel, flagellum reddish brown; tegulae light brown; coxae and femora dark brown, trochanters, tibiae, and tarsi light yellowish brown; wings subhyaline, veins and stigma dark brown. Mandibles with five teeth, the apical two sharp, the basal three rounded, the fourth tooth unusually small, fifth tooth broadly rounded into the inner mandibular margin. Median lobe of clypeus black and polished, without a sharp median carina but with a weakly defined, round-topped Y-shaped elevation, the arms of the Y terminating in lateral tooth-like projections of the apical margin, the latter evenly concavely arcuate between these projections (Fig. 44). Antennae with first four segments in a ratio of about 27:6:14:13, segment three 1.5 X as long as thick, segment eleven also about 1.5 X as long as thick; flagellar pubescence light brown, rather coarse, suberect, erect setae numerous but rather short. Front strongly polished, non-alutaceous, with large punctures which are separated from one another by 1.5-2 X their own diameters. WF .66 X WH, 1.27 X HE; ocelli in a small triangle, the front angle acute, ocelli not at all enlarged; OOL 1.6 X WOT; posterior ocelli removed from vertex crest by a distance about equal to WOT. Vertex rounded off far above eye-tops, distance from eye tops to vertex crest equal to about .8 X HE; occipital carina complete.

Pronotum rather long, disc rather flat, almost rectangular in front, shining and with widely spaced punctures. Mesoscutum shining, non-alutaceous, the few punctures mostly confined to posterior half; notauli present on anterior .7 of mesoscutum, slender and delicate; scutellum shining and with weak punctures. Propodeum 1.35 X as long as broad, disc with median and lateral carinae well developed, also with several irregular longitudinal rugae which start out from the base and soon terminate in some irregular reticulations; sculpturing of posterior half of propodeum in form of fine transverse rugae; spiracles subcircular, opening dorsally. Mesopleurum wholly polished and non-alutaceous, callus large, convex, impunctate, remainder of mesopleurum more or less punctate. Claws dentate. Fore wing with discoidal vein weakly pigmented, not quite as long as basal vein, interstitial with median vein. Genitalia not studied.

(12) PSEUDISOBRACHIUM PARAGUAYENSE new name

Rhabdepyris (?) *albipes* Kieffer, 1904b, p. 411 [Type: ♂, PARAGUAY: Puerto 14 de Mayo, Oct. 1896 (G. Boggiani) (Mus. Civ. Stor. Nat., Genova)]. (Studied one of two cotypes.) Preoccupied in *Pseudisobrachium* by Ashmead, 1894, p. 191.

Parisobrachium albipes Kieffer, 1914, pp. 424-425.

Description of cotype. — Length 2.7 mm; LFW about 2 mm (wings much crumbled). Body dark reddish brown, head nearly black; mandibles straw-colored except darker at extreme base and apex; scape yellowish brown, flagellum dull castaneous except paler at base and apex; legs straw-colored, tarsi almost white, front coxae somewhat infuscated; wings pale, veins and stigma straw-colored. Mandibles moderately wide, probably with five teeth (mandibles partially covered with glue). Median lobe of clypeus narrowly truncate (Fig. 45); median ridge strong, arched in profile. Antennae rather short, first four segments in a ratio of about 19:7:8:8, segments three and eleven each about 1.2 X as long as thick; flagellar pubescence very coarse, semi-erect, pale, longest setulae about half as long as segments bearing them. Front strongly alutaceous, weakly shining, punctures numerous, about their own diameters apart, but shallow and inconspicuous; occipital carina obsolete dorsally. Eyes strongly hairy, bulging and rather coarse-faceted; WH 1.04 X LH. Front slightly wider than height of eye, WF .60 X WH, 1.10 X HE; ocelli slightly enlarged, DAO .21 X WF, in a

rather large triangle, the front angle about a right angle; OOL .72 X WOT. Vertex broadly rounded off a distance above eye-tops equal to only about half HE.

Pronotum with smooth contours, alutaceous, obscurely punctate. Mesonotum wholly alutaceous, moderately shining, including scutellar disc; notauli very faintly indicated, almost absent. Propodeum 1.2 X as long as wide, disc shining and with rather weak sculpturing except for the median carina and some short carinae laterad of it; two of these carinae (very weak) extend about half the length of the propodeum, which can thus be described as obscurely tricarinate. Mesopleurum with callus large and convex, shining, weakly alutaceous, subtended by a strong groove; remainder of mesopleurum moderately alutaceous and obscurely punctate. Claws simple. Wings of cotype in poor condition. Terminalia not studied.

Remarks.—The propodeum of this species does not differ notably from that of several other South American species, and simple claws are not uncommon in the genus. This is a fairly typical *Pseudisobrachium*, and Kieffer's generic name *Parisobrachium* is unnecessary.

(13) PSEUDISOBRACHIUM PLAUMANNI new species

Holotype.—♂, BRAZIL; Nova Teutonia, Santa Catarina, 17 Dec. 1937 (Fritz Plaumann) [BMNH].

Description of type.—Length 5.5 mm; LFW 3.7 mm. Head black except mandibles and clypeus largely castaneous; thorax black except entire pronotum suffused with dull ferruginous; abdomen dark castaneous, shining, each segment with an indistinct apical band of lighter brown; antennae uniformly light castaneous; tegulae testaceous; legs medium brown except tarsi and apices of tibiae light yellowish brown; fore wings lightly tinged with brownish, more strongly so in an indistinct band below the marginal cell. Mandibles with five teeth, basal three teeth somewhat rounded, basal two teeth partially connate. Median lobe of clypeus obtusely subangulate, the sides actually weakly rounded (Fig. 51); median carina strong, arched in profile. Eyes hairy; occipital carina obsolete dorsally. First four antennal segments in a ratio of about 35:8:18:15, segments three and eleven each about twice as long as thick; flagellar pubescence pale, rather coarse, flagellum also with many short erect setae. Front shining, weakly alutaceous just above antennal bases and in ocellar triangle, elsewhere non-alutaceous; punctures small,

sharply defined, separated by about or slightly less than their own diameters. Head about as wide as high; front broad, WF .69 X WH, 1.55 X HE; vertex very broadly rounded off a distance above eye tops about equal to HE. Ocelli not enlarged; front angle of ocellar triangle slightly less than a right angle; OOL 1.6 X WOT; distance from hind ocelli to vertex crest nearly equal to WOT.

Pronotal disc finely transversely rugulose, broadly depressed along posterior margin. Mesoscutum short, weakly alutaceous on the sides, strongly punctate; notauli weakly impressed on anterior half. Propodeum 1.35 X as long as wide, disc 1.05 X as long as wide, margined behind by a delicate carina; median carina extending about .7 the length of the disc, surface of disc reticulate, somewhat striate behind; declivity steep, finely striate. Mesopleurum strongly punctate, weakly alutaceous; callus alutaceous but impunctate. Claws with a short, weak erect tooth. Fore wing with discoidal cell strongly outlined, discoidal vein interstitial with median vein; first recurrent vein pigmented. Abdomen slender, subsessile. Subgenital plate narrowly truncate, its median basal stalk shorter than the lateral stalks (Fig. 57). Genitalia with ventral arms of parameres slightly exceeding and much thicker than dorsal arms; aedocagus relatively short and broad (Fig. 58).

Paratypes. — BRAZIL: 5 ♂♂, same data as type except various dates (Jan. 1963, Mar. 1936, May 1938, Nov. 1937) [BMNH, MCZ].

Variation. — There is considerable size variation in this series (LFW 2.9-4.1 mm). The color of the clypeus and of the pronotum varies from bright castaneous to dusky ferruginous. WF varies from 1.43 to 1.58 X HE. Otherwise there is little noteworthy variation in this series.

Remarks. — This species is of interest because of the fact that the median lobe of the clypeus is not trapezoidal as is usual in this genus; in fact it resembles closely that of several species of *Apenesia*. Yet in most other respects this is a typical *Pseudisobrachium*. The color pattern is suggestive of *P. rufopictum* and *Apenesia fulvicollis*.

(14) PSEUDISOBRACHIUM ANGULATUM new species

Holotype. — ♂, PERU: Iquitos, March, April 1931 (R. C. Shannon) [USNM, No. 64,994].

Description of type.—Length 3.5 mm; LFW 2.7 mm. Head black except sides of clypeus suffused with dull ferruginous; thorax black except pronotal collar dull ferruginous; abdomen dark castaneous, shining, each segment with an apical band of light brown; mandibles pale castaneous, the teeth rufous; antennae pale castaneous, slightly dusky beyond third segment; tegulae testaceous; legs straw colored except front coxae fuscous; wings subhyaline, veins and stigma light brown. Mandibles broad apically, terminating in five sharp teeth. Median lobe of clypeus obtusely angulate (Fig. 50), median carina very high, in profile strongly arched. Eyes strongly hairy; occipital carina absent dorsally. First four antennal segments in a ratio of about 26:5:20:17, segment three 3 X as long as thick, segment eleven 2.5 X as long as thick; flagellar pubescence long, semierect, exceeded by scattered fully erect setae. Front polished, weakly alutaceous just above antennal bases but not elsewhere; punctures strongly defined, separated by less than their own diameters except slightly more widely spaced above. Head slightly higher than wide, WH .93 X LH; WF .63 X WH, 1.23 X HE; vertex extended above eye tops a distance about equal to HE. Ocelli in a compact triangle, front angle much less than a right angle; OOL 1.5 X WOT.

Pronotum weakly and irregularly transversely rugoso-punctate, with a weak transverse depression just before the posterior margin. Mesoscutum polished, strongly punctate, notauli strong, not quite reaching posterior margin; scutellum with basal groove short and deep, center of disc impunctate. Propodeum 1.4 X as long as wide, disc 1.15 X as long as wide; lateral, sublateral, and transverse carina well developed, median carina strong on basal .7 of disc; surface of disc somewhat reticulate basally, weakly striate posteriorly. Mesopleurum with strong punctures except callus convex and impunctate. Claws dentate. Fore wing with costa extending far beyond stigma as a thin vein; discoidal vein pigmented for a distance greater than length of basal vein, but discoidal cell otherwise weakly outlined. Abdomen slender, sessile. Subgenital plate and genitalia resembling those of the preceding species very closely.

Remarks.—This species is known from the type only. The angulate and very strongly carinate clypeus is suggestive of the genus *Apconesia*, and the propodeum is not unlike that of some species of that genus. However, in most other respects this is a typical *Pseudisobrachium*.

II. SUBFAMILY EPYRINAE

Subfamilial characters. — Maxillary palpi with from three to six segments, labial palpi with from one to three; clypeus with its median elevation usually not extending up the lower front as a polished streak; antennae with twelve or thirteen segments, the flagellar pubescence usually short and appressed (some exceptions). Pronotum usually longer than mesoscutum, at least in female; scutellum in contact with the propodeum or very nearly so, the metanotum much reduced, if present as a narrow strip medially then not emarginate or foveolate anteriorly as in male *Pristocerinae*; propodeum with or without a transverse carina margining the disc behind; claws variable, rarely as strongly curved as in the *Bethylinae*. Wings fully developed, shortened, or absent (in either sex), when absent or much reduced the eyes often small, but eye height not less than .25 X head width, propodeum without a strong constriction; alate forms with the basal vein simple (or absent), not giving rise to a vein or stub of a vein, discoidal vein occasionally weakly indicated, second discoidal cell never fully outlined.

Remarks. — This large subfamily is difficult to characterize, since it contains several specialized genera as well as a nucleus of more generalized genera centering around *Rhabdepyris* and *Epyris*. Some workers have placed some of the more highly evolved genera, such as *Cephalonomia* and *Scleroderma*, in a separate subfamily, the *Scleroderminae*. I do not consider these two genera to be closely related, and each is linked to the *Epyrinae* through a series of intermediate genera, *Cephalonomia* through *Plastanoxus* and *Laclius*, *Scleroderma* through *Chilepyris* and *Ncsepyris*. It seems to me best to use the *Epyrinae* in a broad sense, dividing it into three tribes to include the generalized elements (*Epyrini*) and the two more specialized stocks (*Cephalonomiini* and *Sclerodermini*). So far as I know, this arrangement will work for the world fauna, but it is probable that some modifications of the following key will be necessary to accommodate all the Old World genera.

KEY TO TRIBES OF EPYRINAE

1. Antennae with twelve segments; maxillary palpi with 3-5 segments, labial palpi with 1-2 segments; alate forms with a prostigma, the submedian cell (and often the median cell) absent or closed off below and on the outer side by a very weak vein (Figs. 99, 101, 105); fore wing indented on the anterior margin opposite the prostigma; maximum size about 2.5 mm B. CEPHALONOMIINI, p. 148

- Antennae with thirteen segments (but in the males of *Anisepyrus* and *Artiepyrus*, which are fully alate, the third segment may be so small as to escape ready detection); maxillary palpi with 5-6 segments, labial palpi with 2-3 segments; alate forms without a prostigma, the median cell (and often the submedian) fully formed and closed (figs. 63, 113, 118) 2
2. Clypeus short, median lobe, when distinct, broad and truncate or somewhat emarginate (Figs. 114, 117, 120); apterous and subapterous forms common; alate forms with radial vein present or (more often) absent; eyes situated well forward on head, in female not protruding much if any above surface of head and located well toward anterior side, temples thus very large (Figs. 111, 114, 115, 120, 121) C. SCLERODERMINI, p. 160
- Clypeus with a projecting angular or narrowly rounded median lobe (Figs. 64, 75, 95); apterous and brachypterous forms uncommon; alate forms with radial vein strong (although short in *Laelius*) A. EPYRINI, p. 90

A. TRIBE EPYRINI

Tribal characters.—Small to medium-sized bethylids, 1.5-10 mm in length. Maxillary palpi with six segments, labial palpi with three segments; antennae with thirteen segments, but in males of certain groups the third segment is reduced to a mere ring at the base of the fourth, evident only upon close study; clypeus with a median lobe which projects rather strongly and is angulate, subangulate, or narrowly rounded apically; occipital carina present, sometimes weak dorsally. Pronotum often longer than mesoseutum, sometimes very much longer; mesoseutum with notauli usually well developed, reduced or absent in *Holepyrus* and *Laelius*; propodeum with a transverse carina margining the disc behind, nearly always with a complete median carina which often continues on down the declivity, disc often with other longitudinal carinae, posterolateral angles often foveolate; claws variable. Wings usually fully developed, shortened or absent in a few females, but these females show little or no reduction of the thorax or the ocelli; wings not especially slender basally, anterior margin of fore wing nearly straight, anal lobe of hind wing well developed; fore wing with three closed basal cells, including the narrow costal cell, prostigma absent, radial vein present (short in *Laelius*). Male genitalia with the parameres moderately long, strongly hirsute; cuspides slender, often divided into ventral and dorsal arms; aedocagus of simple structure, slender or fairly broad.

Distribution. — Cosmopolitan.

Included genera. — The limits of the tribe Epyrini as here defined are roughly the same as in Kieffer (1914). Several genera are cosmopolitan or nearly so, and some of these genera are very large (*Epyris*, *Rhabdepyris*, *Holepyris*). Nine genera are here recognized for the Americas, four of them restricted to this hemisphere (*Anisepyris*, *Procalyzoa*, *Aspidepyris*, *Bakeriella*). Distinctive genera of the Old World which do not occur in the Americas include *Isobrachium* Foerster, *Pristobethylus* Kieffer, *Acanthepyrus* Kieffer, and *Allepyris* Kieffer. Berland (1928) included *Allepyris* and *Laelius* in the Scleroderminae, but these genera appear to me to fit much better in the Epyrini.

KEY TO GENERA OF EPYRINI

1. Scutellum with a transverse, undivided groove basally, straight or deflected backward at each end, sometimes much broadened on each side to form pits much as below, but in this case still connected by a groove that is fairly deep (Figs. 64, 70, 95) 2
- Scutellum with a pair of basal pits which are usually completely separate, but occasionally they are connected by a very thin and shallow line, or occasionally they are contiguous and separated only by a thin septum (then resembling a divided transverse groove) (Figs. 75, 80, 83) 6
2. Radial vein very short, at most slightly longer than the basal vein (Fig. 94); always fully winged; body and major veins of wings with large, black setae 9. LAELIUS Ashmead, p. 144
- Radial vein long, much longer than basal vein (except in the few subapterous forms) (Figs. 63, 68); body and wing-veins with setae smaller in proportion to size of body 3
3. Clypeus with three prominent lobes, the lateral lobes rounded, exceeded in most species by the more narrow median lobe (Fig. 93); notauli weak and incomplete, sometimes barely discernible; basal vein reaching subcosta well basad of base of stigma (Fig. 90) 8. HOLEPYRIS Kieffer, p. 139
- Clypeus with only the median lobe well developed, lateral lobes absent or very much shorter than median lobe (Figs. 64, 75); notauli well developed in most species, usually complete or nearly so; basal vein reaching subcosta close to base of stigma (Figs. 63, 68) 4
4. Pronotal disc rounded off anteriorly and laterally, its sides not sharp or carinate (Fig. 64); males with third antennal segment distinctly set off from fourth segment, usually slightly shorter than second segment (Fig. 67) 1. RHABDEPYRIS Kieffer, p. 92
- Pronotal disc with a transverse carina in front, the sides sharp and often also carinate (Fig. 70); males with third antennal segment very short, at most .8 X as long as second and usually much shorter than

- this, often so closely consolidated with fourth as to escape ready detection (Figs. 69, 72) 5
5. Eyes strongly hairy; groove at base of scutellum fairly wide, often widened into pits on each side; antennae simple 2. ANISEPYRIS Kieffer, p. 96
Eyes glabrous; groove at base of scutellum rather thin medially, although deep, much expanded on each side; antennae strongly pectinate (Fig. 72) (known from male only) 3. PROCALYOZA Kieffer, p. 102
6. Pronotum with its posterior part elevated and prolonged arcuately backward so as to overlie the base of the mesoscutum (Fig. 80); mesopleurum with an extremely deep fovea below the tegula (known from male only) 5. ASPIDEPYRIS new genus, p. 114
Pronotum with its posterior margin simple, not prolonged backward so as to overlie the base of the mesoscutum (Figs. 75, 83); mesopleurum not nearly so deeply foveolate 7
7. Antennae pectinate (Fig. 89); scutellar disc rather flat and sharp-edged; pronotum not margined anteriorly or laterally, but the anterolateral corners often prominent (known from male only) 7. CALYOZINA Enderlein, p. 136
Antennae simple; scutellar disc not sharp-edged; pronotum with or without a margining carina in front. 8
8. Pronotal disc transversely carinate in front, sometimes also with longitudinal carinae margining the sides and/or with a median carina (Fig. 83); scutellar pits large, in most species separated only by a thin septum; claws dentate 6. BAKERIELLA Kieffer, p. 116
Pronotum simple, without carinae of any kind (Fig. 75); scutellar pits variable, rarely as above; claws variable 9
9. Antennae with 13 distinct segments; male genitalia with the parameres relatively broad, the digiti not as elongate as below (Fig. 76) 4a. EPYRIS (Subgenus EPYRIS Westwood), p. 104
Antennae with only 12 distinct segments, segment three being reduced to a small, barely discernible ring at the base of four, less than half as long as segment two (Fig. 78); male genitalia with the parameres and digiti extremely long and slender (known from male only) (Fig. 77) 4b. EPYRIS (Subgenus ARTIEPYRIS Kieffer), p. 111

1. Genus RHABDEPYRIS Kieffer

Rhabdepyris Kieffer, 1904c, p. 32 (type species *R. myrmecophilus* Kieffer, designated by Kieffer, 1906a). —Kieffer, 1906a, pp. 375-384 (European spp.). —Kieffer, 1908a, pp. 30-32. —Kieffer, 1914, pp. 346-366 (spp. of world). —Berland, 1928, pp. 116-117 (European spp.). —Richards, 1939, pp. 326-327 (British spp.). —Kurian, 1954, pp. 270-271 (Oriental spp.). —Kurian, 1955, pp. 98-100 (Oriental spp.).

Trichotepyris Kieffer, 1906a, p. 376 (type species *Rhabdepyris pallidipennis* Kieffer, designated by Muesebeck and Walkley, 1951, p. 729; proposed

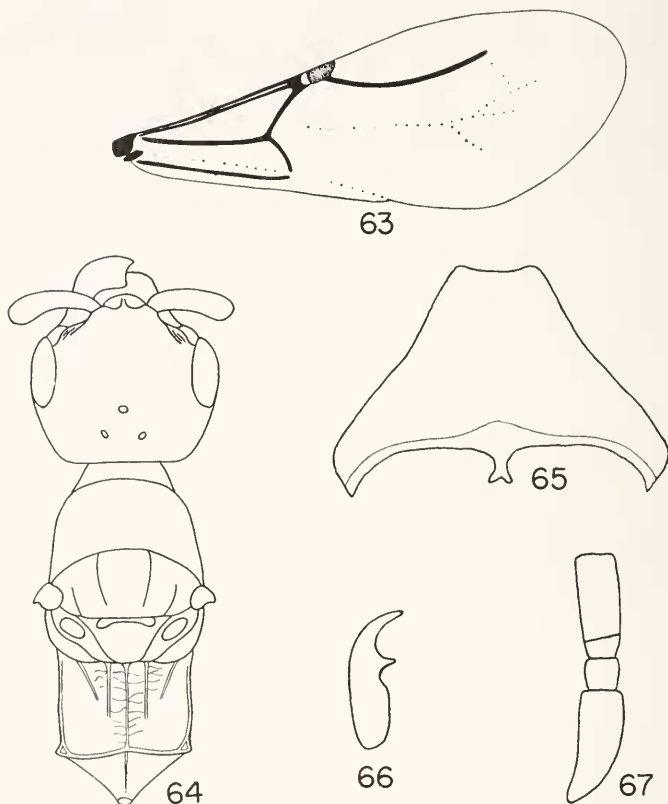
as subgenus of *Rhabdepyris* and placed in synonymy of that genus by Kieffer, 1914, p. 346).

Chlorepyris Kieffer, 1913, p. 108 (type species *Epyris semiviridis* Kieffer, designated by Kieffer, 1914; new synonymy). —Kieffer, 1914, pp. 412-416 (spp. of world). —Kurian, 1955, pp. 101-105 (Oriental spp.).

Generic characters.— Small wasps (2-9 mm); black or with dark metallic colors, abdomen sometimes tipped with rufous. Maxillary palpi with six segments, labial with three; mandibles with from two to five teeth; clypeus with an angular median lobe which is carinate medially, but without lateral lobes; base of clypeus overhung by the antennal sockets, which are at or below the level of the bottoms of the eyes and which arise from the lower side of the prominent lower front; antennae with 13 segments in both sexes, scape somewhat curved, slightly to strongly flattened, flagellum simple; male with third antennal segment distinct but often short; eyes glabrous or covered with hairs; occipital carina complete. Pronotum moderately long, the disc sloping slightly to strongly to the lower plane of the collar, the sides of the disc rounded; mesoscutum shorter than pronotum (except in some males), notauli typically complete although more or less reduced in a few species; scutellum with a basal groove which may be very slender or fairly wide, nearly always turned backward on each side and often widened there; propodeum with a median carina which extends the length of the disc and also down the declivity; propodeal disc margined laterally and posteriorly, with longitudinal carinae in addition to the median carina; posterior lateral corners of propodeal disc foveolate; middle tibiae spinose in some species; claws dentate, bifid, or trifid. Wings very short in females of a few species; fore wing without large setae on the veins; fully winged forms with the stigma rather small, radial vein elongate; basal vein reaching subcosta close to base of stigma, leaving median vein at same point as transverse median vein, the latter somewhat curved; discoidal and subdiscoidal veins at most very faintly indicated. Abdomen fusiform, shining, without modifications in most species. Male subgenital plate with a short median basal stalk, tapering to a truncate or concave apex. Male genitalia with the parameres large, usually rather broad and flat; volsellae complex, the cuspides large, divided into dorsal and ventral arms; aedoeagus simple, elongate. (Figs. 2, 5, 63-67.)

Remarks.— This large, protean, cosmopolitan genus presents fewer specializations than any other genus of Epyrinae, and is

probably rightly considered the most primitive genus of the subfamily. There are several well-defined species-groups, some of which may deserve subgeneric status. It is possible that Kieffer's names *Trichotepyris* and *Chlorepyris* may eventually be revived as subgenera, but pending further study of this genus they are best considered synonyms. A number of other genera of Epyrinae tie in closely to *Rhabdepyris* and may have evolved from it. For example, there is no wide gap between *R. megacephalus* and some of the species of *Anisepyris*; "*Chlorepyris*" appears to represent a stock evolving in the direction of *Epyris*; and several small, smooth-eyed but strongly setose species suggest *Laelius*.



Rhabdepyris megacephalus (Ashmead). Fig. 63. Fore wing. Fig. 64. Head and thorax of female. Fig. 65. Subgenital plate of male. Fig. 66. Hind tarsal claw of female. Fig. 67. Basal four antennal segments of male (scape at bottom).

Biology. — The type species of this genus was taken from an ant nest (*Tetramorium*), and Kieffer (1914) records a second European species from ant nests. I am not aware that any of the American species have been taken from ant nests, and I suspect the occurrence of these two species with ants was accidental. To the best of my knowledge, there are no host records for any of the species of this genus. I have taken these wasps on vegetation covered with honeydew on several occasions, and several specimens before me are marked as having been taken in sweepings from trees, herbs, and crop plants (cotton, alfalfa, sorghum).

Distribution. — This genus appears to be well represented in all zoogeographic regions, although only a few African species have so far been described. In the Americas, the species collectively range from Argentina (but not Chile, so far as known) north to California, Texas, and Massachusetts. I am not aware that the genus occurs in the West Indies (except Trinidad). Only a small percentage of the species have been described.

Included species:

United States

amabilis Fouts, 1927, p. 165; ♀, Maryland.

fulgens (Brues), 1907a, p. 99; ♀, Texas (new combination).

megacephalus (Ashmead), 1893, p. 61; ♀, California (also Arizona, Texas).

Mexico and Central America

metallicus Kieffer, 1908b, p. 16; ♀, Nicaragua.

origenus Kieffer, 1911, p. 222; ♀, Guerrero, Mexico.

quinquelineatus Kieffer, 1906b, p. 249; ♀, Nicaragua.

semiviridis (Kieffer), 1913, p. 108; ♀, Tabasco, Mexico (new name for *viridis* Kieffer, 1911, *nec* Cameron, 1888a) (new combination).

septemlineatus Kieffer, 1906b, p. 250; ♂, Nicaragua.

subaeneus Kieffer, 1906b, p. 248; ♀, Nicaragua.

subviridis (Kieffer), 1911, p. 225; ♂, Tabasco, Mexico (new combination).

viridis Cameron, 1888a, p. 451; ♀, Guatemala.

viridissimus (Kieffer), 1911, p. 225; ♂, Tabasco, Mexico (new combination).

South America

lobatifrons Kieffer, 1910a; p. 297; ♀, Brazil.

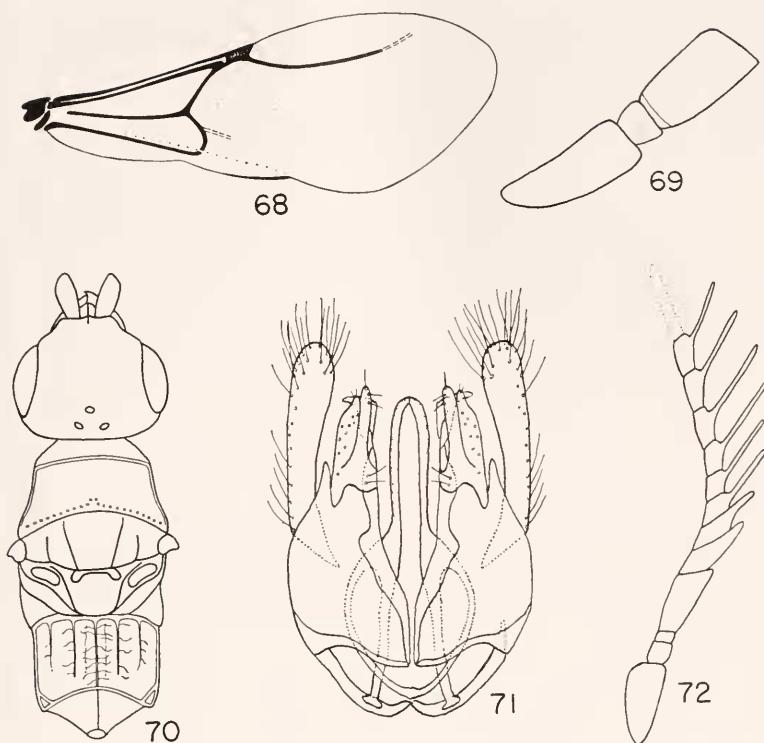
microstoma Kieffer, 1910a, p. 296; ♀, Brazil.
muscarius (Westwood), 1874, p. 159; ♂, Brazil.
obscuripennis Kieffer, 1910, p. 40; ♂, Brazil.

2. Genus ANISEPYRIS Kieffer

Anisepyris Kieffer, 1905b, p. 248 (type species *Epyris amazonicus* Westwood, monobasic. —Kieffer, 1906e, p. 137. —Kieffer, 1908a, pp. 32-33. —Kieffer, 1914, pp. 434-444 (spp. of world). —Evans, 1959a, pp. 69-75 (spp. of Greater Antilles). —Evans, 1959b, pp. 97-120 (spp. of United States).

Lophepyris Evans, 1959c, pp. 201-204 (type species *Rhabdepyris* (*Lophepyris*) *bridwelli* Evans, original designation; proposed as subgenus of *Rhabdepyris*; new synonymy).

Generic characters. — Small wasps (2.5-9 mm); black or dark metallic in coloration, abdomen sometimes tipped with rufous. Palpi and mandibles as described for *Rhabdepyris*; median lobe of clypeus angular, rounded, or truncate, with a strong median carina, lateral lobes not developed; eyes strongly hairy; antennae arising from the lower side of a transverse prominence formed by the lower front; laterally this prominence extends obliquely upward to the lower inner eye margins, this portion often carinate; antennae simple, 13-segmented in both sexes, but in the males the antennae appear superficially 12-segmented, the third segment being reduced to a mere ring-segment closely consolidated with the fourth segment (not more than .8 as long as second segment and often much less than this, sometimes barely discernible); occipital carina complete. Pronotum with an anterior collar, an oblique or nearly vertical anterior face, and a large flat or weakly convex disc, the disc with a transverse carina in front, its sides rather sharp and often also carinate; notauli complete or nearly so; scutellum with a transverse basal groove which is fairly wide and commonly turned backward and slightly enlarged on each side; propodeal disc subquadrate, with strong lateral and posterior carinae, the posterior lateral corners often foveolate, also with at least three discal carinae, the median carina complete and extending down the declivity; mesopleura as in *Rhabdepyris*; claws variable, also as in *Rhabdepyris*, and wing venation differing in no way from that genus. Features of abdomen, including male terminalia, essentially as described for *Rhabdepyris*. (Figs. 3, 68-71; see also figures in Evans, 1959b.)



Anisepyrus and *Procalyzoa* spp. Fig. 68. Fore wing of *Anisepyrus venustus* n. sp., male. Fig. 69. Basal four segments of antenna of male *A. columbianus* (Ashmead). Fig. 70. Head and thorax of male *A. venustus* n. sp., holotype. Fig. 71. Male genitalia of *A. aeneus* Kieffer. Fig. 72. Antenna of male *Procalyzoa westwoodi* (Cameron), holotype. The shape of the apical segment is hypothetical, since this segment is missing in this, the only known specimen.

Remarks.—This large genus is confined to the New World, where it undoubtedly arose as an offshoot of that element of the genus *Rhabdepyris* which includes *megacephalus* Ashmead. Perhaps *Anisepyrus* should be treated as a subgenus of *Rhabdepyris*, especially since certain species, such as *bridwelli* Evans, are somewhat intermediate in structure between the two groups. These intermediate species lack carinae on the sides of the pronotal disc (although the edge of the disc is sharp) and also have the third segment of the male antennae slightly less reduced than

is usual in *Anisepyris*. Formerly I assigned these species to *Lophepyris*, which I placed as a subgenus of *Rhabdepyris*. I have since discovered that *amazonicus*, the type species of *Anisepyris*, is in fact a "*Lophepyris*" (as is also *aeneus*, designated as type of the genus by Kieffer in 1905 although actually a *nomen nudum* at that time). Also, I have discovered that certain species have the sides of the pronotal disc carinate in front, the carinae fading out posteriorly. It appears that the sharpest break is between those species having the pronotal disc rounded in front and on the sides (*Rhabdepyris*) and those having it sharp, carinate at least in front (*Anisepyris*). Both of these genera can be divided into a number of species-groups, but it seems to me unwise to employ subgeneric names at this time.

Biology. — Nothing is known of the host relationships of members of this genus, even though some of the species are not uncommon. Adults have occasionally been taken at flowers, rather commonly on foliage covered with honeydew, also in sweepings from trees and herbaceous vegetation.

Distribution. — Members of this strictly American genus collectively range from Argentina, Bolivia, and Peru to Massachusetts, Michigan, and British Columbia, including the Greater and Lesser Antilles.

Included species. — About forty species of this genus have been described, but the total number probably exceeds 100, as there are many undescribed Central and South American species.

United States

aeneiceps (Ashmead), 1893, p. 58; ♀, Florida.

analis (Cresson), 1872, p. 193; ♀, Texas (to Florida & North Carolina).

arizonicus Evans, 1959b, p. 112; ♀, Arizona.

bradleyi (Evans), 1959c, p. 203; ♀, Texas (new combination).

bridwelli (Evans), 1959c, p. 202; ♀, Texas (also eastern Mexico; ♂ also described) (new combination).

columbianus (Ashmead), 1893, p. 60; ♀, District of Columbia (Florida and Texas to Kansas, Illinois, Massachusetts; ♂ described by Evans, 1959b) (synonym: *pulchellus* Fouts, 1928).

dietrichorum Evans, 1959b, p. 118; ♀, Arizona.

gibbosifrons Evans, 1959b, p. 116; ♀, New Jersey (also Florida; ♂ also described).

grandis (Ashmead), 1887, p. 76; ♀, Florida (♂ described by Evans, 1959b).

laticeps Evans, 1959b, p. 113; ♀, Arizona (♂ also described).

occidentalis (Ashmead), 1893, p. 58; ♀, California (Arizona & California to Idaho & Washington) (synonym: *punctaticeps* Kieffer, 1906c, ♂).

rugosicollis Brues, 1908, p. 48; ♀, Texas.

subviolaceus Kieffer, 1910b, p. 39; ♀, Colorado (Florida, Texas & New Mexico to Pennsylvania, Michigan, & British Columbia) (♂ described by Evans, 1959b).

williamsi Evans, 1959b, p. 106; ♀, California (Arizona & California to Oregon & Idaho; ♂ also described).

Central America

aeneus Kieffer, 1906c, p. 138; ♀, Nicaragua.

coriaceus Kieffer, 1908b, p. 15; ♂, British Honduras.

fasciipennis Kieffer, 1906c, p. 139; ♀, Nicaragua.

fuscicornis Kieffer, 1908b, p. 15; ♂, British Honduras.

rufosignatus Kieffer, 1908b, p. 14; ♀, British Honduras.

sublevis Kieffer, 1906c, p. 140; ♂, Nicaragua.

venustus Evans, n. sp. described below from ♂, ♀, Morelos, Mexico.

West Indies

aureus Kieffer, 1910b, p. 38; ♀, Cuba (incorrectly placed in synonymy with *aurichalceus* by Evans, 1959a).

aurichalceus (Westwood), 1874, p. 160; ♀, Cuba (also Puerto Rico and Virgin Islands) (synonyms: *viridis* Kieffer, 1908b, *nee* Cameron, 1888a; *viridellus* Kieffer, 1914; *cubensis* Fouts, 1928).

darlingtoni Evans, 1959a, p. 73; ♀, Haiti.

excisus Evans, 1959a, p. 72; ♀, Haiti.

insularis (Ashmead), 1894, p. 189; ♂, St. Vincent.

planiceps (Fabricius), 1804, p. 201; ♀, "Americae insulis" (Cuba).

rufitarsis Kieffer, 1908b, p. 13; ♂, Cuba.

wolcottii Evans, 1959a, p. 72; ♀, Haiti.

South America

amazonicus (Westwood), 1874, p. 161; ♀, Brazil.

bogotensis Kieffer, 1910b, p. 41; ♀, Colombia (new combination).

eganellus (Westwood), 1874, p. 160; ♀, Brazil.

- eganus* (Westwood), 1874, p. 160; ♂, Brazil.
fabricii (Westwood), 1874, p. 161; ♂, British Guiana.
luteipes Kieffer, 1905d, p. 97; ♂, Trinidad.
metallicus Kieffer, 1905d, p. 95; ♂, Trinidad.
peruvianus Kieffer, 1910b, p. 40; ♀, Peru (new combination).
smithianus (Westwood), 1874, p. 160; ♀, Brazil (new combination).

ANISEPYRIS VENUSTUS new species

Holotype. — ♂, MEXICO: MORELOS: 3 mi. NW Cuernavaca, 6500 feet elevation, 3 June 1959 (H. E. Evans) [MCZ, No. 30,801].

Description of type. — Length 5.4 mm; LFW 3.2 mm. Dorsum of head and thorax dull olive-green; underside of head, sides and venter of thorax, coxae, and entire propodeum black; abdomen black, strongly shining; palpi testaceous; mandibles suffused with rufous above and apically; antennae dark brown, basal two segments nearly black; legs beyond coxae bright, pale castaneous except hind femora strongly suffused with brown, other femora as well as hind tibiae and tarsi very weakly suffused with brown. Wings nearly hyaline, fore wing very faintly tinged with brownish anteriorly; stigma brown, veins light brown. Mandibles terminating in five sharp teeth in almost a straight line. Apical margin of clypeus forming a right angle medially; median carina very strong, arched in profile. Antennae arising far below bottoms of eyes, the scrobes not carinate. First four antennal segments in a ratio of about 27:7:3:18; segment four about twice as long as thick, segment eleven about 2.5 X as long as thick. Eyes densely covered with short setae. Head rather broad, WH 1.12 X LH; WF .63 X WH, 1.26 X HE; OOL 1.20 X WOT; posterior ocelli separated from occipital carina by slightly more than their own diameters. Front strongly alutaceous although moderately shining, wholly covered with small, deep punctures which are separated by from 0.7-2.0 X their own diameters.

Pronotal disc with strong anterior and lateral carinae, its posterior margin paralleled by a line of foveae which projects forward at the midline (Fig. 70); pronotum, like the mesonotum, moderately alutaceous and with small, well-separated punctures. Notauli complete although very thin anteriorly; groove at base of scutellum deflected backward and somewhat expanded on

each side. Propodeal disc 1.9 X as wide as long, with five strong discal carinae and two additional weaker carinae close beside the median carina; surface shining, with fine transverse striae laterad of the discal carinae; lateral carinae and foveae of posterior corners strong, sublateral carinae absent; declivity with transverse striae and a strong median carina. Mesopleurum with the upper fovea small but fully outlined, lower fovea not well defined above. Middle tibiae not spinose; claws with a strong tooth which slopes outward somewhat. Fore wing as shown in Figure 68. Subgenital plate with a small, arcuate apical emargination. Genitalia almost exactly as figured for *aeneus* Kieffer (Fig. 71) except as follows: parameres with setae confined to apical third, stronger than in *aeneus*; ventral (mesal) arms of cuspides slightly shorter than dorsal (lateral) arms.

Male paratypes. — MEXICO: MORELOS: 14, same data as type except dates varying from 20 May to 3 June, 1959 [MCZ, CU, USNM, ENAC]; 1, Cuernavaca, 5500 feet, 16 May 1959 (M. A. Evans) [MCZ]; 1, Huajintlan, 2800 feet, 1 June 1959 (H. E. Evans) [MCZ].

Variation in males. — LFW varies from 2.9 to 3.3 mm. Coloration of the dorsum of the head and thorax varies from dull olive-green through blue-green to a more shining dark steel-blue; in a few specimens the legs are less strongly suffused with brown than described for the type, in fact almost uniformly rufo-testaceous. The series is very uniform in sculpturing and in standard measurements, the Huajintlan specimen, although from a considerably lower elevation, differing in no noticeable way from the series from Cuernavaca and vicinity.

Allotype. — ♀, MEXICO: MORELOS: same data as type except dated 20 May 1959 [MCZ].

Description of allotype female. — Length about 6.5 mm: LFW 3.9 mm. Dorsum of head and thorax dull olive-green, also the mesopleura, remainder of head and thorax, including the propodeum, black; abdomen shining black; palpi testaceous; mandibles ferruginous; antennae wholly rufo-castaneous, the flagellum slightly paler below than above; tegulae testaceous; legs wholly bright rufo-castaneous except coxae blackish. Fore wing slightly more strongly suffused with brownish than in the male. Mandibles with an apical tooth, above this tooth the apical margin forming a single blade-like cutting edge. Antennae arising well below bottoms of eyes; scrobes not carinate; eyes densely hairy. WH 1.13 X LH; WF .61 X WH, 1.10 X HE; OOL 1.22 X

WOT. Front somewhat more closely punctate than in male. Thoracic dorsum as described for male, but somewhat duller and more strongly alutaceous; features of propodeum and mesopleura also differing in no important details from male. Middle tibiae not spinose; claws dentate.

Remarks.— Only one female is known. The entire type series was taken at honeydew on various trees; most of the specimens (all of those from 3 mi. NW of Cuernavaca) were taken on the tips of the branches of several spreading acacias growing in an open field just below the lower limit of the pine forest. This species, like most of those from the Neotropics, will not fit into any of the species-groups recognized by Evans (1959b) for the species occurring in the United States.

3. Genus PROCALYOZA Kieffer

Procalyza Kieffer, 1905b, p. 248 (type species *Calyza westwoodi* Cameron, monobasic). —Kieffer, 1908a, p. 34. —Kieffer, 1914, p. 433.

Generic characters (of male; female unknown).— Minute wasps (about 3 mm long), black, somewhat metallic in color. Mandibles with five sharp teeth in an even row; clypeus with an angular median lobe which is strongly carinate medially, without lateral lobes, eyes glabrous; front with a linear impression on lower half, at extreme base with a carina which is continuous with median carina of clypeus; antennae arising from ventral side of a prominence of the lower front, as in the preceding two genera; antennae of male 13-segmented, segment three much wider than long, only about one-third as long as second segment, not strongly set off from fourth segment, segment four very long, slightly produced apically, segments 5-12 each with a strong process, the processes on segments 7-10 much longer than the length of the segments; occipital carina complete, although rather weak dorsally. Pronotal disc very short, margined by a strong carina in front and on the sides; notauli strong, complete: groove at base of scutellum strongly expanded on each side, narrow medially although distinct and deep; propodeum and mesopleura as in *Anisepyris*; claws dentate; wings as in *Anisepyris*. (Fig. 72.)

Remarks.— This genus is known from a single male specimen in the British Museum. It is possible that the antennae of the female are simple, in which case this sex will resemble *Anisepyris* in all respects other than (presumably) the glabrous eyes. Probably the genus is a derivative of *Anisepyris*, and perhaps it deserves no more than subgeneric status. Kieffer is not correct in

stating that the scutellum has two pits at base rather than a transverse groove; there is a distinct, deep transverse groove which is expanded on each side to form a pair of pits, as in some species of *Anisepyris* (about as in Fig. 70).

Biology. — Unknown.

Distribution. — Panama.

Included species. — Only the type species, which is redescribed below.

PROCALYOZA WESTWOODI (Cameron)

Calyzoa (?) *westwoodi* Cameron, 1888a, p. 456, pl. 19, fig. 25 [Type: ♂, PANAMA: Bugaba (G. C. Champion) (BMNH)].

Procalyzoa westwoodi Kieffer, 1905b, p. 248. — Kieffer, 1914, p. 433.

Description of type male. — Length 3 mm; LFW about 2 mm. Head and thorax dark, dull olive-green; propodeum black; abdomen shining black, apical two segments suffused with brownish; mandibles castaneous, the teeth rufous; antennae wholly medium brown; legs dark brown except trochanters, front tibiae, and all tarsi light yellowish brown; wings hyaline, veins and stigma brown. Median lobe of clypeus forming about a right angle; median carina high, arched in profile. First four antennal segments in a ratio of about 16:7:2:15, segment three a mere ring at base of four, fourth segment slightly produced apically; segments five and six with somewhat longer apical processes, segments 7-10 with processes longer than length of segments, the processes of segments 11 and 12 about as long as length of segments (segment 13 missing on both antennae of type) (Fig. 72). Front strongly alutaceous, rather weakly shining; punctures small, shallow, inconspicuous. WH 1.07 X LH; inner orbits subparallel below, WF .66 X WH, 1.3 X HE. Ocelli in about a right triangle, OOL 1.1 X WOT. Vertex evenly rounded off a short distance above eye tops.

Pronotal disc only .35 X as long as its maximum width, only .8 X as long as mesoscutum; disc strongly alutaceous, moderately shining, obscurely punctate; posterior margin not paralleled by a groove. Mesoscutum and scutellum alutaceous, punctures obscure. Propodeal disc 1.4 X as wide as long, with five discal carinae, the median one complete, the submedians nearly complete, the lateral discals rather short; disc with a few transverse ridges between the three central carinae, on the sides with very fine transverse striae. Mesopleura with the pit strong, the surface otherwise without completely enclosed foveae. Fore wing with

transverse median vein strongly arched. Terminalia not examined.

Distribution. — Panama; known only from the type.

4. Genus EPYRIS Westwood

4a. Subgenus EPYRIS Westwood

Epyris Westwood, 1832, p. 129 (type species *Epyris niger* Westwood, monobasic). —Kieffer, 1905b, p. 250 (first use in more restricted sense). —Kieffer, 1906a, pp. 309-337 (European spp.). —Brues, 1907a, pp. 96-100 (key to U.S. spp.). —Kieffer, 1908a, pp. 26-28. —Kieffer, 1914, pp. 308-346 (spp. of world). —Berland, 1928, pp. 111-116 (French spp.). —Richards, 1939, pp. 321-326 (British spp.). —Kurian, 1955, pp. 88-98 (Oriental spp.).

Muellerella Saussure, 1892, pl. 25, fig. 20 (type species *Muellerella amabilis* Saussure, monobasic; new synonymy).

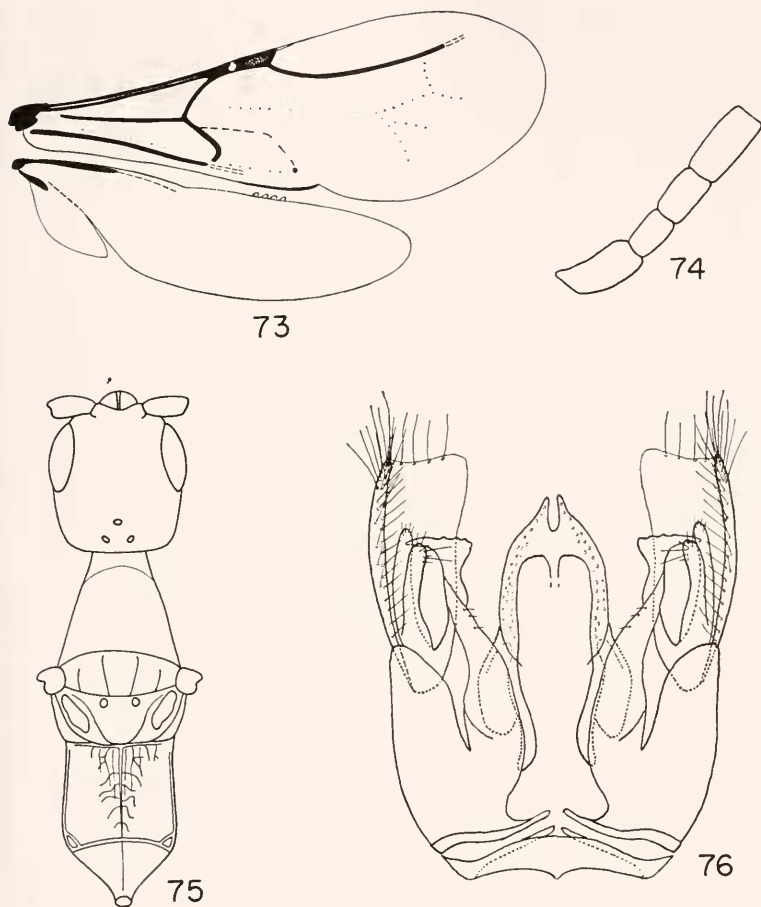
Mesitius Ashmead, 1893, pp. 62-67 (U. S. spp.; not *Mesitius* Spinola, misidentification). —Ashmead, 1902, p. 272.

Parepyris Kieffer, 1913, p. 108 (type species *Epyris interruptus* Kieffer, designated by Kieffer, 1914; new synonymy) (not *Parepyris* Brèthes, 1913, p. 87). —Kieffer, 1914, pp. 410-412.

Psilepyris Kieffer, 1913, p. 108 (type species *Epyris indivisus* Kieffer, designated by Kieffer, 1914; new synonymy). —Kieffer, 1914, pp. 400-401.

Subgeneric characters. — Small wasps (2-10 mm); body black, rarely metallic bluish or greenish, a few species marked with rufous or yellowish brown. Mandibles slender and curved, with from two to five teeth, rarely blunt and edentate; clypeus with a strong median lobe which is typically angular, occasionally rounded or subtruncate, generally with a strong median ridge; lateral lobes of clypeus not distinct or at least much less prominent than median lobe; antennae located on the ventral side of paired prominences of the lower front; antennal scrobes not margined; antennae arising at or below level of bottoms of eyes, simple, with 13 distinct segments in both sexes, female with scape strongly flattened; eyes glabrous or hairy, in most species short and not nearly reaching top of head. Pronotum very much longer than mesoscutum except in males of a few species, the disc rounded off laterally, anteriorly sloping down to the lower level of the collar; mesoscutum with parapsidal furrows and notauli distinct; base of scutellum with a pair of pits which are completely separate except sometimes connected by a very thin, shallow line, rarely separated only by a thin septum; propodeal disc margined laterally and posteriorly, median carina at least

weakly developed, usually with several well developed discal carinae; females with the femora strongly expanded and flattened, middle tibiae often spinose; claws variable, dentate, bifid, or trifid. Wings abbreviated or absent in females of a few species, fully winged forms with venation similar to that of *Rhabdepyris* and *Anisepyrus*. Abdomen sessile, fusiform, without unusual modifications; abdomen of male slightly compressed apically, the genitalia also slightly compressed; subgenital plate more



Epyris (Epyris) bifoveolatus (Ashmead). Fig. 73. Wings of female. Fig. 74. Basal four antennal segments of male (scape at lower left). Fig. 75. Head and thorax of female. Fig. 76. Male genitalia.

or less triangular, with a median stalk; genitalia with the parameres broad and hirsute, the cuspides biramous, as in *Rhabdepyris* (simple in a few species), the aedoeagus simple but typically broader than in *Rhabdepyris* and *Aniscepyris*. (Figs. 73-76.)

Remarks. — This is one of the largest genera of Bethyliidae. There is little question that it is a derivative of *Rhabdepyris*. In fact, some Neotropical species resemble that genus closely, having a similar transverse impression on the mesoscutum and having the scutellar pits slender and oblique, connected by a very thin line, representing only a slight change from those species of *Rhabdepyris* in which the scutellar groove is thin and deflected backward on each side. In all probability the present distinction made between *Epyris* and *Rhabdepyris* will be found to be superficial, and some of the species-groups of each genus will be found to be based on more fundamental characters. However, it seems unwise to make any major changes in the classification at this stage of our knowledge.

I have examined specimens of the type species of *Muellerella* and *Parepyris*, and I do not feel that these species are sufficiently sharply separated from *Epyris* to deserve generic status. I have also studied the type specimen of *Psilepyris indivisus* Kieffer. It is not true that the propodeum of this species is without longitudinal carinae, as Kieffer indicated. The median carina is weak, and there are no other discal carinae, but this condition is approximated by several other species and is of no generic value.

Biology. — The biology of *Epyris extraneus* Bridwell has been studied in Hawaii by Williams (1919). This species is a predator on the larvae of *Gonocephalum seriatum* (Boisduval) (Tenebrionidae), selecting partially grown larvae, 13 to 16 mm long, although the wasp is only about 6 mm long. After the larva has been immobilized by stinging, it is carried over the ground in a most unusual manner, the wasp seizing it by a palpus and "slinging it over her back"; the beetle larva hides the wasp from above, making it appear as if the larva were "making headway under its own steam." The prey is concealed between lumps of soil while the wasp selects a nesting place. The *Epyris* is an excellent digger, and prepares a simple nest in the soil in which the beetle larva is placed and a single egg laid upon it. Williams figured the egg, larva, pupa and cocoon of the wasp, and supplied many details on its biology which cannot be reviewed here. Williams also mentioned that Bridwell found

an *Epyris* in South Africa dragging a small tenebrionid larva. In the collection of the California Academy of Sciences there is a pinned tenebrionid larva taken by F. X. Williams at Danville, California, and labeled "parasitized by bethylid"; Williams also took several *Epyris* (sp. undetermined) at about the same time and place, although none seem to be definitely labeled as having been associated with this larva. It is probable that most if not all species of *Epyris* attack beetle larvae which live in the ground.

Wasps of this genus have been recorded as stinging humans on several occasions. Although the sting itself is not severe, it may produce systemic effects including numbness, itching, asthma, and even diarrhoea (Geldern, 1927; Essig, 1932; Essig and Michelbacher, 1932).

The species of *Epyris* are most commonly taken on vegetation covered with honeydew, and there are a few records of them visiting flowers. They are also commonly taken while sweeping, and occasionally in Berlese samples from soil. The type of Brues' species *myrmecophilus* was taken from a nest of the army ant *Eciton coecum*, but I suspect its occurrence in the nest was accidental.

Distribution. — This genus is represented by numerous species in all zoogeographic regions. In the Americas the genus occurs from Argentina to southern Canada. No species have previously been reported from the West Indies, but I have described below two species from the Greater Antilles. Only a small percentage of the Neotropical species have been described.

Included species:

United States

bifoveolatus (Ashmead), 1893, p. 66; ♂, Florida (widely distributed in eastern U.S.).

brachypterus (Ashmead), 1893, p. 66; ♀, "Carolina."

californicus (Ashmead), 1893, p. 65; ♀, California (also Utah).

clarimontis Kieffer, 1906b, p. 243; ♀, California.

deficiens Krombein, 1956, p. 156; ♀, West Virginia.

criogoni Kieffer, 1906b, p. 245; ♂, California.

formicoides (Provancher), 1887, p. 179; ♀, Quebec (placed in *Epyris* by Krombein, 1958).

gracilicollis Kieffer, 1908a, p. 28; ♀, California (new name for *longicollis* Kieffer, 1906b, p. 244, *nec* Cameron, 1888a).

- indivisus* Kieffer, 1906b, p. 243; ♂, California.
minutus (Ashmead), 1893, p. 65; ♂, Virginia.
monticola Ashmead, 1890, p. 8; ♂, Colorado.
myrmecophilus (Brues), 1903, p. 124; ♀, Texas.
nevadensis (Ashmead), 1893, p. 64; ♀, Nevada.
nudicornis Kieffer, 1906b, p. 245; ♂, Nevada.
rufipes (Say), 1824, p. 329; "North-West Territory"
 (sex not stated).
texanus (Ashmead), 1893, p. 67; ♀, Texas.
vancouverensis (Ashmead), 1893, p. 64; ♀, British Columbia.
vierecki Krombein, 1962, p. 1; ♂, Maryland (♀ also described).

Mexico and Central America

- albipalpis* Kieffer, 1906b, p. 244; ♀, Nicaragua.
guatemalensis Cameron, 1888a, p. 453; ♀, Guatemala.
montezuma Cameron, 1888b, p. VII (Errata); ♀, Mexico
 (new name for *rufipes* Cameron, 1888b, p. 173; *nec* Say, 1824).
multicarinatus Cameron, 1888a, p. 452; ♀, Panama.
nigripilosus (Ashmead), 1895a, p. 539; ♀, Mexico.
nitidiceps Cameron, 1888a, p. 451; ♀, Panama.
oriplanus Kieffer, 1911, p. 228; ♀, Mexico.

West Indies

- hispaniolae* Evans, n. sp. described below from ♀, Haiti.
manni Evans, n. sp. described below from ♀, Haiti (also Puerto Rico).

South America

- bipunctatus* Kieffer, 1910b, p. 35; ♂, Bolivia.
flavivus Kieffer, 1910b, p. 36; ♂, Peru.
montivagus Kieffer, 1910b, p. 31; ♂, Peru (synonyms:
lindigi Kieffer, 1910b, p. 32; *bogotensis* Kieffer, 1910b,
 p. 34; new synonymy).
paraensis Kieffer, 1910a, p. 296; ♀, Brazil.
quinquepartitus Kieffer, 1910b, p. 33; ♀, Peru.
subspinus Kieffer, 1910b, p. 36; ♂, Bolivia.

EPYRIS (EPYRIS) HISPANIOLAE new species

Holotype. — ♀, HAITI: Etang Lachaux, SW Peninsula, under 1000 feet, 26-27 Oct. 1934 (P. J. Darlington, Jr.) [MCZ, No. 30,802].

Description of type.—Length about 3 mm. LFW 2.0 mm. Head entirely testaceous except for the blackish eyes; prothorax entirely testaceous except pronotum narrowly bordered with black behind, thorax and propodeum otherwise black; abdomen dark reddish brown, slightly paler basally and apically; antennae testaceous basally, brownish beyond segment two; front coxae and tibiae and all trochanters and tarsi testaceous, front femora and middle and hind coxae and tibiae weakly suffused with brown, middle and hind femora brown. Wings hyaline, fore wing with two conspicuous brown spots, one over the transverse median vein, the other over and below the radial vein. Mandibles bidentate. Clypeus with a narrowly rounded median lobe and a pair of broadly rounded lateral lobes which are very much shorter than the median lobe. Antennal sockets on level of bottoms of eyes; first four antennal segments in a ratio of about 5:2:1:2, segments three and eleven each slightly wider than long. Eyes with sparse, short setae. WH and LH subequal; WF .56 X WH, .95 X HE; vertex almost straight across, distance from eye tops to vertex crest equal to about one-third HE. Ocelli in a compact triangle slightly above eye tops, close to vertex crest, front angle less than a right angle; OOL 1.25 X WOT. Front strongly alutaceous although moderately shining, punctures shallow and widely spaced.

Pronotum with smooth contours, the disc nearly twice as long as mesoscutum; surface of pronotum, mesoscutum, and scutellum alutaceous, somewhat shining, obscurely punctate. Notauli complete although much thinner anteriorly. Scutellar pits elongate, oblique, separated by about twice their own length. Propodeal disc about 1.5 X as wide as long, polished and weakly sculptured except for seven strong, closely parallel discal carinae, the median three complete and the other four nearly complete; median extending down posterior slope, which is otherwise shining, with only some very weak sculpturing. Front femora 2.1 X as long as wide; middle tibiae very weakly spinose; claws with a strong, erect tooth and also subdentate basally. Fore wing with transverse median vein moderately curved. Abdomen polished, fusiform.

Remarks.—The coloration of this species is (so far as I know) unique in the genus. The weakly hairy eyes are also unusual. This species is known from a single specimen.

EPYRIS (EPYRIS) MANNI new species

Holotype.—♀, HAITI: Grande Rivière (W. M. Mann) [MCZ, No. 30,803].

Description of type.—Length 4.4 mm; LFW 3.0 mm. Head and thorax black; abdomen piceous, apical two segments dark reddish brown; palpi testaceous; mandibles, antennae, and legs wholly bright rufo-testaceous, tegulae testaceous. Fore wing subhyaline, very weakly clouded at the radial vein; hind wings hyaline. Mandibles slender, bearing a longitudinal ridge, their apices blunt and not distinctly dentate. Median lobe of clypeus short, obtusely angulate, its tip somewhat rounded. Antennae arising well below level of bottoms of eyes; first four antennal segments in a ratio of about 28:6:5:8, segment three wider than long, segment eleven slightly longer than wide. Eyes bare. Head 1.05 X as wide as high; WF .64 X WH, 1.3 X HE; vertex passing straight across, distance from eye tops to vertex crest equal to about .4 X HE. Ocellar triangle well above eye tops, close to vertex crest, front angle greater than a right angle; OOL 1.15 X WOT. Front weakly alutaceous, shining, punctures small but sharply defined, separated by 1-2 X their own diameters except more widely spaced toward vertex.

Pronotal disc with smooth contours, about 1.5 X as long as mesoscutum; surface of pronotum punctate much like the front, but the mesonotum with somewhat weaker punctures. Notauli complete although very thin anteriorly; scutellar pits oblique, longer than wide, separated by slightly more than 3 X their own length, connected by a very thin, shallow line. Propodeal disc 1.6 X as wide as long, with five discal carinae, all weak and incomplete except the median carina, space between the carinae with transverse ridges, remainder of disc polished, with very delicate transverse lines; posterior face slightly concave, with weak sculpturing except for a strong median carina. Front femora 1.8 X as long as wide; middle tibiae strongly spinose; claws bidentate. Fore wing with transverse median vein strongly oblique, forming almost a right angle below. Abdomen polished, fusiform.

Paratype.—♀, PUERTO RICO: Maricao, July 1960 (J. Maldonado C.) [USNM].

Variation.—The paratype is slightly smaller (LFW 2.5 mm) and is slightly darker, the abdomen being wholly black, the front coxae strongly infuscated, and the antennae suffused with brownish on the apical half. WF measures .61 X WH, 1.25 X HE;

OOL measures 1.16 X WOT. There are no noteworthy differences in the scutellar pits or the sculpturing of the head, thorax, or propodeum.

4b. Subgenus ARTIEPYRIS Kieffer

Artiepyris Kieffer, 1913, p. 108 (type species *Epyris dodecatomois* Kieffer, monobasic). —Kieffer, 1914, p. 428.

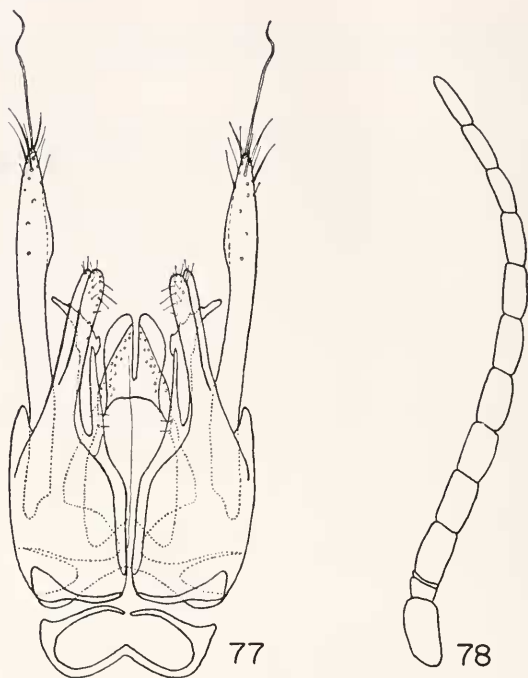
Subgeneric characters (of male; female unknown). — Small wasps (3-6 mm); body black, without metallic reflections. Mandibles slender, with from one to three apical teeth; clypeus with a prominent, angular median lobe, lateral lobes absent; antennae arising slightly below bottoms of eyes, long and slender but with only 12 readily apparent segments, segment three being reduced to a small ring at the base of four, less than half the length of segment two; eyes glabrous. Characters of thoracic dorsum as in *Epyris sensu stricto*, known species all with the scutellar pits more or less round, fairly large but well separated; propodeum with several discal carinae, the median carina extending down the declivity; claws bifid, rather strongly curved. Wings fully developed, venation as in *Epyris sensu stricto*. Subgenital plate rounded apically, bearing strong setae. Genitalia differing greatly from those of *Epyris sensu stricto*, parameres very long and slender, cuspides also very long and slender, biramous; aedeagus relatively short and broad. (Figs. 77, 78.)

Remarks. — The above diagnosis was based on several Oriental species as well as our single Neotropical species. Presumably the females cannot be distinguished from *Epyris sensu stricto*, but the males differ so strikingly that it seems desirable to maintain *Artiepyris* as a subgenus. The genitalia of the Oriental species are closely similar to those of *dodecatomois*. With respect to the antennae, *Artiepyris* bears the same relationship to *Epyris* as *Anisepyrus* bears to *Rhabdepyris*; however, *Artiepyris* is completely without the pronotal modifications of *Anisepyrus*.

Biology. — Unknown.

Distribution. — There are several species in the MCZ from southeast Asia, including the Philippines. In the New World only one species is known, ranging from Costa Rica to southern Mexico.

Included species. — In our fauna, only *dodecatomois* Kieffer, which is redescribed below.



Epyris (Artiepyris) dodecatomus (Kieffer). Fig. 77. Male genitalia. Fig. 78. Antenna of male.

EPYRIS (ARTIEPYRIS) DODECATOMUS (Kieffer)

Epyris dodecatomus Kieffer, 1906b, p. 242 [Type: ♂, NICARAGUA: San Marcos (C. F. Baker) (Pomona College, Claremont, Calif.)].

Artiepyris dodecatomus Kieffer, 1913, p. 108. —Kieffer, 1914, p. 428.

Description of type. — Length 3.7 mm; LFW 3.0 mm. Body wholly shining black; palpi straw-colored; mandibles pale castaneous; antennae wholly rufo-castaneous, apical segments very weakly infuscated; tegulae testaceous; legs wholly bright yellowish brown except front coxae black, other coxae moderately infuscated; apical two abdominal segments weakly suffused with dark red; wings hyaline. Mandibles slender, tridentate apically. Clypeus with the median lobe obtusely angulate, with a strong median carina which is straight in profile and which forms a weak median tooth apically. First four antennal segments in a ratio of about 40:8:3:36, segment four twice as long as thick,

segment eleven 2.6 X as long as thick (Fig. 78). Front strongly shining, barely alutaceous, wholly covered with small punctures which are separated by 1-2 X their own diameters. Head about as wide as high; inner orbits strongly convergent below, WF .57 X WH, 1.10 X HE; ocelli situated far above eye-tops, front angle of ocellar triangle about a right angle; OOL 1.25 X WOT; posterior ocelli removed from crest of vertex by about their own diameters.

Pronotum considerably longer than mesoscutum, without a well-defined anterior face, merely sloping to the collar; disc shining, weakly alutaceous, punctures weak, separated by 2-3 X their own diameters medially, more crowded laterally. Mesonotum shining, obscurely alutaceous, punctures numerous but very weak; notauli attenuate and weakly divergent anteriorly; scutellar pits of moderate size, rounded although slightly longer than wide, separated by nearly twice their own diameters, apparently connected by a thin, shallow impression anteriorly. Propodeal disc 1.4 X as broad as long; lateral and posterior carinae strong, disc with five carinae, of which only the median is complete; extreme sides of disc somewhat foveolate, rest of disc shining and with weak transverse striae, obsolescent laterally and posteriorly. Mesopleurum weakly alutaceous, obscurely punctate, with a complex arrangement of ridges and grooves. Genitalia as shown in Figure 77.⁴

Other specimens examined. — MEXICO: MORELOS: 2 ♂♂, 4 mi. E. of Cuernavaca, about 6000 feet, 23-29 June 1959 (H. E. Evans) [MCZ]. COSTA RICA: 1 ♂, Suretka, Prov. Limon, 31 May 1924 (J. C. Bradley) [CU].

Variation. — The two Mexican specimens resemble the type very closely, including head measurements, but they are somewhat larger (LFW 3.4 mm in both). The Costa Rica specimen is also slightly larger (LFW 3.2 mm) and differs in color slightly, the apical half of the abdomen being suffused with dark rufous and the scape somewhat infuscated; in this specimen the head is longer, the front slightly wider, and the front angle of the ocellar triangle slightly less than a right angle (WH .92 X WH; WF .60 X WH, 1.15 X HE; OOL 1.35 X POL). The genitalia of the Mexican and Costa Rican specimens differ only in minor details of the volsellar structures.

⁴ This figure was drawn from one of the Mexican specimens, those of the type not having been dissected.

5. Genus *ASPIDEPYRIS* new genus

Type species.—*Aspidepyris foveolatus*, new species.

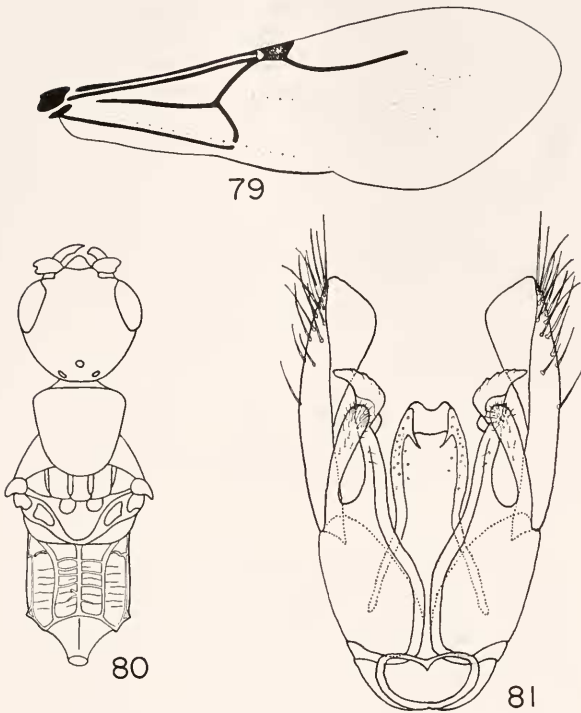
Generic characters (of male; female unknown).—Small wasps (about 3.5 mm); body predominantly black, without metallic reflections. Palpi as in *Epyris*; mandibles moderately slender, terminating in three teeth; clypeus with a prominent, angular median lobe which is carinate medially; antennal sockets located very slightly below level of bottoms of eyes, opening obliquely downward; antennae with 13 clearly defined simple segments, segments two and three subequal in length, slightly shorter than four; eyes glabrous; vertex extending well above tops of eyes, crest of vertex very sharp, subcarinate; occipital carina distinct. Pronotum very much longer than mesoscutum, disc sloping upward very gradually from a short anterior collar, disc nowhere carinate but with very sharp margins which approach gradually behind; posterior median part of pronotum elevated above level of lateral parts and above level of mesoscutum, prolonged arcuately so as to overlie the base of the mesoscutum; notauli in the form of rather broad grooves, which are very close together; scutellar disc triangular, flat, and sharp-edged, scutellar pits large, deep, and circular; propodeum with several longitudinal carinae, median carina continuing on down the declivity; posterior lateral angles of propodeal disc foveolate; mesopleurum with very coarse sculpturing, with a lunate fovea just below the tegulae which is extremely deep in the center, elsewhere with a complex series of ridges and foveae; claws dentate; middle tibiae weakly spined. Wings as in *Epyris*, and as shown in Figure 79. Abdomen sessile, shining, somewhat tapering apically; subgenital plate simple, subtriangular; genitalia with the parameres broad and bearing strong setae, cuspides long and slender, not divided into dorsal and ventral arms, aedoeagus relatively short and broad. (Figs. 79-81.)

Remarks.—This genus, presently known from a single specimen, is undoubtedly a derivative of *Epyris*. It is possible that it should be included in *Epyris* as a subgenus, but I think not. The form of the pronotum is unique in the Bethyridae, and the very deep pits of the mesopleurum are also unusual. Presumably these characters will also be found to be present in the female sex.

Biology.—Unknown.

Distribution.—Honduras.

Included species.—Only the type species, described below.



Aspidepyris foveolatus n. sp., male holotype. Fig. 79. Fore wing. Fig. 80. Head and thorax. Fig. 81. Genitalia.

ASPIDEPYRIS FOVEOLATUS new species

Holotype. — ♂, HONDURAS: La Ceiba, 18 Oct. 1916 (F. J. Dyer) [AMNH].

Description of type male. — Length about 3.5 mm; LFW 2.4 mm. Body shining, head and thorax black, abdomen dark reddish brown, slightly paler apically; palpi straw-colored; mandibles testaceous; antennae bright rufo-castaneous, except scape somewhat infuscated and apical few segments suffused with brownish; tegulae testaceous; legs bright testaceous, except all coxae strongly infuscated; fore wing weakly infuscated, somewhat more distinctly infuscated in and below marginal cell; hind wings subhyaline. Apical teeth of mandibles sharp, basal tooth broadly rounded. Median lobe of clypeus angular, but the tip rounded. First four antennal segments in a ratio of about

14:9:9:13, segment three very slightly wider than long, segment eleven 1.8 X as long as thick. Front strongly shining, weakly alutaceous, punctures small but well defined, separated by two to four X their own diameters. WH 1.03 X LH; WF .55 X WH, 1.06 X HE; vertex broadly rounded off a considerable distance above eye tops. OOL 1.10 X WOT; posterior ocelli removed from the sharp vertex crest by less than their own diameters.

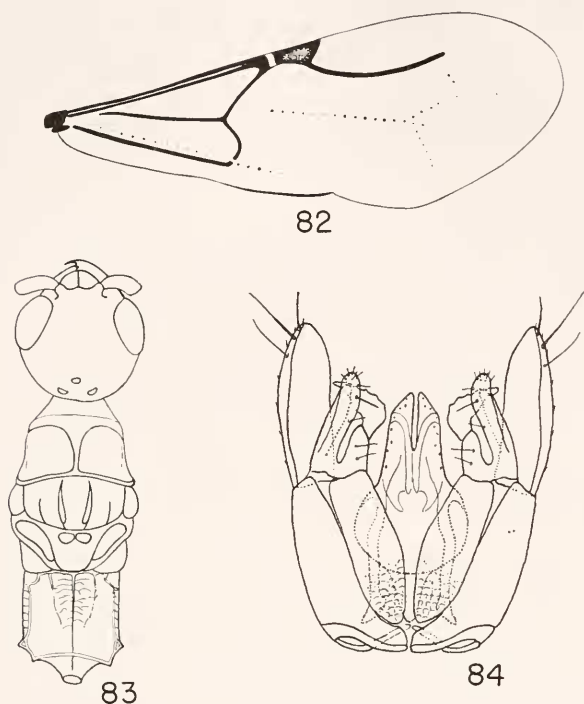
Pronotum 3.5 X as long as mesoscutum; disc somewhat shining, alutaceous, with coarse but shallow punctures. Distance between notauli only slightly greater than width of notauli. Pits at base of scutellum separated by slightly less than their own diameters, large and bowl-shaped. Propodeum with three very strong discal carinae, all of them complete, the lateral discs flat-topped; lateral, sublateral, and transverse carinae all strong; disc shining, the space between the carinae filled with rather weak and irregular transverse striae; side-pieces obliquely striate. Wings as shown in Figure 79; genitalia as shown in Figure 81.

6. Genus *BAKERIELLA* Kieffer

Bakeriella Kieffer, 1910a, p. 288 (type species *Bakeriella flavicornis* Kieffer, monobasic). —Kieffer, 1914, pp. 444-445.

Generic characters.—Small wasps (2.5-5 mm) of predominantly black, non-metallic coloration. Mandibles moderately broadened apically, terminating in from two to five teeth; clypeus with the median lobe angulate or subangulate, sometimes very broadly so, lateral lobes not developed; antennae arising at or slightly below level of bottoms of eyes, scrobes sometimes margined; antennae simple, with 13 clearly defined segments, third segment no longer than second or fourth in either sex, usually slightly shorter; eyes glabrous or hairy; occipital carina complete. Pronotum with a distinct but short, oblique anterior face, the disc often rather flat, transversely carinate in front, sometimes also with longitudinal carinae margining the sides and/or with a median carina; notauli rather wide, much attenuate anteriorly, sometimes incomplete; scutellar disc not as flat and sharply margined as in *Aspidepyris*, the basal pits large, rounded or somewhat transverse, separated by a thin septum or by a broad, flat-topped ridge; propodeum with the median carina complete and continuing down declivity, disc with or without other carinae, lateral and posterior carinae well developed, posterior lateral angles more or less foveolate; mesopleurum of the same form as in *Rhabdepyris* and *Epyris*; claws

dentate; femora of female not greatly widened or strongly flattened. Wings fully developed, venation as in *Epyris*. Abdomen sessile, fusiform, slightly depressed apically, especially in female; male genitalia differing in no notable manner from those of *Epyris sensu stricto*. (Figs. 82-84.)



Bakeriella spp. Fig. 82. *B. azteca* n. sp., male holotype, fore wing. Fig. 83. Head and thorax of same specimen. Fig. 84. *B. floridana* n. sp., paratype, male genitalia.

Remarks.—Kieffer used the name *Bakeriella* for two species having the pronotum carinate laterally and medially as well as anteriorly. There are, however, some species in which the pronotum has only a weak indication of median or lateral carinae, and other apparently related species in which only the transverse, anterior carina is present. Thus I use the name *Bakeriella* somewhat more broadly than did Kieffer. The genus bears much

the same relationship to *Epyris* as *Anisepyris* does to *Rhabdepyris*, so far as the pronotum goes, but the antennae are not modified as in *Anisepyris*. Undoubtedly, *Bakeriella* is a derivative of a stock of *Epyris sensu stricto*.

Biology. — Unknown.

Distribution. — This genus is confined to the Americas, the known species ranging from Brazil and Bolivia to central Mexico and to southern Florida. I have seen no specimens from the West Indies, but the occurrence of a species in southern Florida suggests that the genus may occur in the Antilles. Ten new species are described below, bringing the total number of known species to twelve.

Included species:

North and Central America

- azteca* Evans, n. sp. described below from ♂, Morelos, Mexico (sp. 4).
floridana Evans, n. sp. described below from ♂, ♀, Florida (sp. 12).
inconspicua Evans, n. sp. described below from ♂, Panama (also southern Mexico, Costa Rica, Venezuela) (sp. 11).
olmeca Evans, n. sp. described below from ♂, ♀, Veracruz, Mexico (sp. 3).

South America

- brasiliانا* Evans, n. sp. described below from ♀, Brazil (sp. 7).
cristata Evans, n. sp. described below from ♂, Bolivia (also Brazil) (sp. 6).
depressa Kieffer, 1910b, p. 56; ♂, Peru (also Panama, Costa Rica; redescribed below, sp. 1).
flavicornis Kieffer, 1910a, p. 289; ♂, Brazil (redescribed below, sp. 2).
inca Evans, n. sp. described below from ♀, Peru (sp. 5).
polita Evans, n. sp. described below from ♂, Bolivia (also Peru), (sp. 9).
rossi Evans, n. sp. described below from ♂, Colombia (sp. 8).
rufocaudata Evans, n. sp. described below from ♂, Colombia (also Costa Rica) (sp. 10).

KEY TO SPECIES OF *BAKERIELLA*

1. Scutellar pits subcircular, slightly longer than wide, separated by a flat-topped ridge over half as wide as diameter of one of pits; pronotal disc with a strong transverse carina in front and a weak median carina, but the sides of the disc smoothly rounded (Bolivia, Brazil; known from ♂ only) (6) *cristata* n. sp.
 Scutellar pits wider than long, separated by only a thin septum; pronotal disc variable, but always with the sides abrupt, sometimes carinate or subcarinate 2
2. Temples with a strong, vertical carina, well separated from the occipital carina, curving forward below to approach or touch the lower outer eye margins (males only) 3
 Temples not carinate (males and females) 5
3. Pronotum with a rather delicate median carina, sometimes obsolete in part, without distinct lateral carinae; apical half of flagellum rather strongly infuscated (Mexico) (3) *olmecca* n. sp.
 Pronotum with a very strong median ridge and also more or less carinate laterally; flagellum pale castaneous, weakly infuscated apically 4
4. Transverse carina of pronotum, as seen obliquely from behind, strongly sinuate, subdentate on the sides (Peru, Panama, Costa Rica) (1) *depressa* Kieffer
 Transverse carina of pronotum, as seen from behind, rather even, not produced or subdentate (Brazil) (2) *flavicornis* Kieffer
5. Pronotum with a well-developed, complete median carina 6
 Pronotum without a median carina 7
6. Median carina of pronotum occupying a shallow depression and continuous behind with a transverse polished band along the posterior margin; mesoscutum strongly transversely depressed; eyes hairy (Peru; known from ♀ only) (5) *inca* n. sp.
 Median carina of pronotum not in a depression, continuous with a dull, alutaceous elevation along posterior margin; mesoscutum barely depressed; eyes with only very weak hairs (Mexico; known from ♂ only) (4) *azteca* n. sp.
7. Antennal scrobes not carinate (females) 8
 Antennal scrobes margined by delicate carinae (males) 10
8. Legs wholly testaceous; scape testaceous, flagellum light reddish brown; transverse carina of pronotum gently arched (Florida) (12) *floridana* n. sp.
 Legs blackish, at least basally; antennae darker than above; transverse carina of pronotum broadly angulate 9
9. Mandibles with five teeth, the basal three teeth small; front with small punctures which are separated by 1.5-3.0 X their own diameters (Mexico) (3) *olmecca* n. sp.
 Mandibles with only the two large apical teeth; front with somewhat stronger and more widely spaced punctures (Brazil) (7) *brasiliانا* n. sp.

10. Antennae unusually elongate, segment eleven at least twice as long as thick; apical .4 of abdomen rufous; pronotal disc polished, weakly alutaceous (Colombia, Costa Rica) (10) *rufocaudata* n. sp.
 Antennae relatively short, segment eleven not more than 1.7 X as long as thick; tip of abdomen at most weakly suffused with reddish brown 11
11. Front and pronotal disc polished, weakly or hardly at all alutaceous; larger species, LFW 2.8-3.6 mm 12
 Front and pronotal disc weakly shining, strongly alutaceous; smaller species, LFW up to 2.4 mm 13
12. Vertex rather narrowly rounded off far above eye tops; median lobe of clypeus roundly subangular; antennae castaneous, somewhat infuscated on apical third (Bolivia, Peru) (9) *polita* n. sp.
 Vertex more broadly rounded off, not so strongly elevated above eye tops; median lobe of clypeus rather strongly angular; antennae dark brown on apical half to three-fourths (Colombia) (8) *rossi* n. sp.
13. Sides of pronotal disc subparallel, subcarinate; coxae and femora dark brown (Mexico, Panama, Costa Rica, Venezuela) (11) *inconspicua* n. sp.
 Sides of pronotal disc diverging behind, not at all carinate; legs bright testaceous except front coxae infuscated (Florida) (12) *floridana* n. sp.

(1) *BAKERIELLA* *DEPRESSA* Kieffer

Bakriella depressa Kieffer, 1910b, p. 56 [Type: ♂, PERU: Marepata (Staudinger) (Berlin Museum, No. 169)]. —Kieffer, 1914, p. 445.

Description of type male. —Length 4.1 mm; LFW 2.7 mm. Black; palpi light brown; mandibles yellowish brown except base infuscated; antennae light reddish brown except basal half of scape infuscated; tegulae castaneous; coxae and femora piceous, tibiae brown, somewhat infuscated, trochanters and tarsi castaneous; wings hyaline, veins and stigma amber. Mandibles with five teeth, the basal four subequal. Clypeus obtusely triangularly produced, tectiform medially. First four antennal segments in a ratio of about 2:1:1:1, segment three as well as segment eleven about 1.4 X as long as thick. Front strongly alutaceous, rather weakly shining, with weak punctures which are separated from one another by from 2-3 X their own diameters. Antennal scrobes margined by short, transverse carinae which run to the eye margins; upper, inner orbits weakly carinate; temples with a very strong carina and somewhat foveolate immediately in front of this carina. Eyes strongly converging below; WF .51 X WH, 1.1 X HE; ocelli small, in

about a right triangle, OOL 1.27 X WOT, posterior ocelli removed from vertex crest by about their own diameters. Vertex nearly straight across; distance from eye tops to vertex crest equal to slightly more than half HE.

Pronotum somewhat wider than long, subrectangular, bordered anteriorly by a high ridge, the two halves of which meet medially and continue backward as a strong median carina; this ridge is subdentate laterally, and forms a pair of submedian crests of irregular profile; lateral carinae running just inside the lateral margins and not quite reaching posterior margin; posterior margin paralleled by a row of fairly large foveae; disc of pronotum strongly alutaceous, punctures weak. Mesoscutum short, with notauli of unusual breadth which do not quite reach the anterior or posterior margin; scutellum alutaceous, the pits transverse, separated by a median ridge. Propodeum with disc .9 X as long as wide, median carina complete, also with two additional carinae which curve mesad posteriorly and extend .7 X the distance to the transverse carina. Mesopleurum shining, somewhat alutaceous. Femora flattened and rather short, posterior femur only 2.2 X as long as wide.

Other specimens examined.—PANAMA: 1 ♂, Barro Colorado Island, Canal Zone, 18 June 1924 (N. Banks) [MCZ]. COSTA RICA: 3 ♂♂, vic. of Santa Clara de San Carlos, Alajuela Prov., 17-19 Feb. 1964 (H. E. Evans) [MCZ]; 1 ♂, 5 mi. N of Quesada, Alajuela Prov., 20 Feb. 1964 (H. E. Evans) [MCZ]; 1 ♂, 12 mi. SW of Cañas, Guanacaste Prov., 27 Feb. 1964 (H. E. Evans) [MCZ].

Variation.—All of the Panama and Costa Rica specimens are smaller than the type (LFW 2.2-2.6 mm) and all have the antennae weakly infuscated apically and the fore wings weakly clouded, especially on the apical third. In these specimens WF varies from 1.0 to 1.15 X HE, OOL from 1.20 to 1.45 X WOT. Minor variations can be observed in the details of sculpturing on the pronotum and propodeum, and in the five Costa Rica specimens the upper, inner orbits are not really carinate, but merely weakly grooved.

(2) BAKERIELLA FLAVICORNIS Kieffer

Bakeriella flavicornis Kieffer, 1910a, p. 289 [Type: ♂, BRAZIL: Pará (C. F. Baker) (Pomona College, Claremont, Calif.)]. —Kieffer, 1914, pp. 444-445.

Description of type male.—Length 3.8 mm; LFW 2.5 mm. Black; palpi straw-colored; mandibles and antennae wholly pale castaneous; tegulae testaceous; coxae nearly black, femora dark brown, legs otherwise light yellowish brown; wings clear hyaline. Mandibles slender, with five apical teeth, all but the apical tooth very small. Clypeus obtusely produced medially, subdentate medially, its median carina very strong, strongly arched in profile. First four antennal segments in a ratio of about 20:8:8:9, segment three and segment eleven each about 1.3 X as long as thick. Front strongly alutaceous, moderately shining, with weak punctures which are separated from one another by 2-3 X their own diameters. Antennal scrobes margined by a transverse carina which extends all the way from the midline to both eye margins; upper inner orbits weakly carinate; temples with a strong carina which runs from the vertex close along the outer orbits to the base of the mandibles. Head very slightly longer than wide; inner orbits convergent below, WF .53 X WH, subequal to HE; distance between eyes at top 1.6 X distance between eyes at bottom; ocelli of moderate size, front angle of ocellar triangle less than a right angle, distance between hind ocelli and vertex crest about equal to diameter of one of ocelli; OOL 1.3 X WOT. Vertex straight across; distance from eye tops to vertex crest equal to slightly over half HE.

Pronotal disc somewhat wider than long, bordered anteriorly by a high ridge, the two halves of which meet medially and continue backward as a strong median carina; this ridge, seen from behind, has a rather even profile; disc also with weak lateral carinae which reach the posterior margin and with strong sublateral elevations, just above the lateral carinae, which do not reach the posterior margin; posterior margin of disc paralleled by a series of fairly large foveae; surface of disc alutaceous, shining, obscurely punctate. Mesoscutum short, notauli rather broad, tapering anteriorly and barely reaching anterior margin; scutellum with its basal pits separated by a median ridge which continues on behind as a weak median elevation on the disc; surface of mesoscutum and scutellum shining, rather weakly alutaceous. Disc of propodeum very slightly wider than long; lateral, sublateral, and posterior margining carinae all strong, median carina also strong; disc also with two additional carinae which curve mesad posteriorly and extend about .8 X the length of the disc; disc obscurely transversely striate between these carinae, otherwise shining and very weakly sculptured. Mesopleurum strongly alutaceous, weakly shining.

(3) BAKERIELLA OLMECA new species

Holotype. — ♂, MEXICO: VERACRUZ: 30 mi. S. Acayucan, 21 April 1962 (F. D. Parker) [CAS].

Description of type male. — Length 3.2 mm; LFW 2.2 mm. Body entirely black; mandibles testaceous except black at base, rufous at apex; palpi testaceous; antennae light brown except basal two-thirds of scape dark brown, flagellum gradually infuscated toward tip; legs dark brownish-fuscous except tibiae lighter brown, tarsi testaceous; tegulae brownish; fore wings lightly tinged with brownish, more distinctly so around the radial vein. Mandibles with five teeth, the basal three teeth small and more rounded than the two outermost teeth. Clypeus short, broadly, obtusely angulate, not distinctly carinate medially. Antennal scrobes weakly carinate; eyes with sparse, short setae. First four antennal segments in a ratio of about 18:7:8:9, segment three about 1.6 X as long as thick, segment eleven about 1.5 X as long as thick. Head 1.05 X as wide as high; inner orbits strongly converging below, WF .58 X WH, 1.20 X HE. Front angle of ocellar triangle less than a right angle; OOL 1.40 X WOT. Vertex very broadly rounded; occipital carina visible at top of vertex in full frontal view. Front strongly alutaceous, somewhat shining, obscurely punctate, with a linear median streak. Temples with a strong carina which starts at the vertex and extends to the base of the mandibles, approaching but not quite touching the lower outer eye margins.

Pronotal collar longitudinally ridged, the disc rather convex, margined in front with a transverse carina which is obtusely angulate behind medially, the angulation giving rise to a very weak median carina which extends to the elevated rim of the posterior margin, this rim preceded by a line of small foveae; sides of disc rather sharp, subcarinate in front; top and sides of pronotum alutaceous, moderately shining, obscurely punctate. Mesoscutum with the notauli very strong on the posterior part, surface of scutum and scutellum alutaceous, without noticeable punctures; pits at base of scutellum large, transverse, separated medially by a thin septum. Propodeum with three discal carinae, the median carina complete, the disc shining and with rather weak sculpturing. Mesopleurum with a very strong, arching ridge, about and behind which it is somewhat foveolate. Transverse median vein of fore wing moderately arched. Abdomen strongly shining; apical sternite with some strong bristles.

Allotype. — ♀, same data as type [CAS].

Description of allotype female.—Length about 4 mm; LFW 2.8 mm. Body black; palpi testaceous; mandibles castaneous except black at base, the teeth rufous; mandibles dull ferruginous except strongly infuscated on the apical segments; legs black except trochanters and tibiae ferruginous, tarsi light brown; wings lightly tinged with brownish, more especially so around the radial vein. Mandibles with five teeth, the basal three teeth small and rounded, in a more oblique series than in the male. Clypeus as in male. Antennal scrobes not carinate; eyes with somewhat stronger hairs than in male. Third antennal segment 1.3 X as long as thick; eleventh segment very slightly wider than long. WH .92 X LH; WF .60 X WH, 1.28 X HE; OOL 1.7 X WOT. Front shining, rather weakly alutaceous, the punctures small, separated by 1.5-3 X their own diameters. Vertex broadly rounded off far above eye tops; temples well developed, but completely without carinae.

Pronotal collar with longitudinal ridges; disc rather convex, margined in front by a carina which is weakly angled forward medially; median carina completely absent; posterior margin paralleled by a row of small foveae; sides of disc rather abruptly rounded onto side-pieces; surface somewhat shining and with small punctures like the front. Features of remainder of thorax differing in no important ways from those of the male. Front femora 2.5 X as long as their maximum width; middle tibiae with some strong spines. Abdomen strongly shining, with some strong setae toward the apex ventrally.

Paratypes.—One δ , same data as type and allotype [UCD].

Variation.—The single male paratype is very similar to the type in size, color, and nearly all details of structure. However, the median carina of the pronotum is quite distinctly stronger.

Remarks.—This species is of interest as indicating that carinae on the temples and a carina on the median line of the pronotum may be present in the male sex when absent in the female. Thus the females of the two previous species may be found to lack these carinae. There seems little question that the two sexes of *olmecca* are correctly associated, as the specimens were taken at the same time and place and have many striking similarities.

(4) *BAKERIELLA AZTECA* new species

Holotype.— δ , MEXICO: MORELOS: Huajintlan, 2500 ft., 14 May 1959 (H. E. Evans) [MCZ, No. 30,804].

Description of type male.—Length 4 mm; LFW 2.4 mm. Body entirely shining black; palpi testaceous; mandibles castaneous, the teeth rufous; antennae castaneous, slightly infuscated on apical half; tegulae testaceous; coxae nearly black, legs otherwise bright, pale castaneous, except femora weakly suffused with brownish; wings hyaline, veins and stigma brown. Mandibles with five teeth, basal four teeth small, sharp, and subequal. Clypeus broadly subangular, median carina arched in profile. Antennal sockets connected by a carina, this carina continuing laterad almost to eye margins; first four antennal segments in a ratio of about 20:8:7:8, segment three 1.2 X as long as thick, segment eleven 1.3 X as long as thick; flagellar pubescence rather coarse. Head about as wide as high; eyes strongly diverging above, WF .56 X WH, 1.15 X HE. Ocelli in a right triangle, OOL 1.3 X WOT; vertex very broadly rounded, distance from eye tops to vertex crest equal to about two-thirds HE. Eyes with some very short, scarcely noticeable hairs. Front strongly alutaceous, although moderately shining, punctures numerous but very shallow. Temples not carinate.

Pronotal disc about half as long as its maximum width, with a strong transverse anterior ridge which gives rise to a strong median carina; sides of disc subcarinate; posterior margin of disc paralleled by a weakly impressed, weakly foveolate groove; disc alutaceous and moderately shining, like the front. Mesoscutum with the notauli broad, not reaching anterior margin; surface of mesoscutum alutaceous, obscurely punctate. Basal pits of scutellum transverse, separated by only a very weak septum. Propodeal disc 1.25 X as broad as long, with three longitudinal carinae, the median carina complete, the other two carinae extending for about .8 X the length of the disc, converging behind; disc polished and very weakly sculptured, except between the carinae, where it is irregularly transversely striate. Wings shown in Figure 82.

Remarks.—This species is known only from the type, which was collected at honeydew on a broadleaved tree growing beside a draw. It is very similar to the preceding three species, but the temples are completely without carinae.

(5) *BAKERIELLA INCA* new species

Holotype.—♀, PERU: Puerto Bermudez, Rio Pichis, 12-19 July 1920 (Cornell Univ. Exped.) [CU].

Description of type female. — Length 4.2 mm; LFW 3.0 mm. Head and thorax black, abdomen dark reddish brown, slightly paler basally and apically; palpi brown; mandibles black at base, apical half testaceous, teeth rufous; antennae wholly dark brown; tegulae brownish; legs wholly dark brown, except tarsi and tips of tibiae light yellowish brown; wings lightly tinged with brownish, veins and stigma dark brown. Mandibles of unusual form, extending strongly downward, their lower margins nearly straight, apex with three teeth in a strongly oblique series, the most basal tooth very small. Median lobe of clypeus relatively very broad and short. Antennal scrobes not margined; eyes hairy. First four antennal segments in a ratio of about 3:1:1:1, segment three about 1.2 X as long as thick, segment eleven approximately as long as thick. Head very slightly longer than wide, WH .97 X LH; WF .59 X WH, 1.25 X HE. Ocelli in a compact triangle far removed from eyes, OOL nearly twice WOT; vertex passing straight across far above eye tops, distance from eye tops to vertex crest about .7 X HE. Front shining, weakly alutaceous, with small but sharply defined punctures which are separated by 2-4 X their own diameters. Temples not carinate.

Pronotal disc rather flat, about two-thirds as long as its posterior width, transverse anterior carina rather low, median carina also low but very distinct, occupying a shallow longitudinal depression, continuous behind with a polished streak along posterior margin of pronotum; sides of disc rather sharp, but not carinate; surface alutaceous, with fairly large punctures. Mesoscutum transversely depressed behind, notauli and parapsidal furrows rather short, not as wide as in preceding species; posterior part of mesoscutum alutaceous, somewhat punctate. Scutellum with basal pits transverse, separated medially by a thin septum. Propodeal disc slightly longer than wide, lateral and transverse carinae strong, disc with three carinae, median carina complete, other two carinae extending about .7 X the length of the disc; surface of disc smooth and shining except weakly sculptured between the carinae. Front femora 2.4 X as long as thick; middle tibiae strongly spinose. Abdomen fusiform, tapering and slightly depressed apically.

(6) *BAKERIELLA CRISTATA* new species

Holotype. — ♂, BOLIVIA: Cuatro Ojos, Prov. Santa Cruz, Nov. 1931 (Steinbach) [CM].

Description of type male.—Length 4 mm; LFW 2.9 mm. Black; palpi testaceous; mandibles castaneous, the teeth rufous; antennae dull castaneous, apical few segments dusky, scape strongly infuscated; tegulae brownish; legs dark brown except front tibiae and all tarsi testaceous; fore wing strongly tinged with brownish, hind wing subhyaline. Mandibles terminating in two large teeth. Median lobe of clypeus tectiform, subangular, but extreme tip subtruncate. Antennal scrobes not carinate; eyes very weakly hairy. First four antennal segments in a ratio of about 19:10:10:13, segment three barely longer than thick, segment eleven 1.4 X as long as thick. Head about as wide as high; WF .55 X WH, 1.0 X HE. Ocelli in a broad triangle, front angle slightly greater than a right angle; WOT slightly exceeding OOL; vertex rather sharp, broadly rounded off a distance above eye tops equal to much less than half HE. Front moderately shining, on lower half alutaceous and obscurely punctate, upper half more weakly alutaceous and with stronger punctures; temples not carinate.

Pronotum with a strong anterior ridge which extends down the sides, that portion of pronotum in front of ridge flat, nearly vertical; disc of pronotum with a very weak longitudinal carina which terminates behind in a pair of small pits just before the posterior margin, also with some additional very weak longitudinal irregularities; posterior margin of pronotum not paralleled by a punctate or foveolate groove; sides of disc broadly rounded onto side pieces, the latter rather flat but with a shallow longitudinal groove. Mesoscutum with the notauli rather broad and close together posteriorly, toward the front diverging and much attenuate. Scutellum rather flat, the basal pits large, bowl-shaped, slightly longer than wide, separated by a flat-topped ridge which is slightly more than half as wide as maximum diameter of pits. Propodeal disc 1.25 X as wide as long, with five widely spaced longitudinal carinae in addition to the lateral carinae, all these carinae complete or nearly so, space between carinae filled with rather small transverse striae; mesopleurum weakly alutaceous, with strong sculpturing. Fore wing as in Figure 82, except transverse median vein more strongly oblique and more distinctly subangulate.

Paratypes.—BRAZIL: 1 ♂, Chapada, Jan. [CM]; 1 ♂, Nova Teutonia, Santa Catarina, 5 April 1938 (F. Plaumann) [BMNH].

Variation.—The two paratypes are smaller than the type (LFW about 2.2 mm in both). The fore wing is subhyaline in both, but otherwise the coloration is very similar. All of the unusual features of the thorax and propodeum are shared in close detail by these two specimens. The Nova Tentonia specimen is without a head. In the Chapada specimen, WF measures .54 X WH, 1.0 X HE; OOL is .90 X WOT; the eleventh antennal segment is 1.25 X as long as wide.

(7) *BAKERIELLA BRASILIANA* new species

Holotype.—♀, BRAZIL: Minas Gerais, Ouro Preto, April 1954 (N. L. H. Krauss) [USNM, No. 64,997].

Description of type female.—Length about 4 mm; LFW 2.8 mm. Head and thorax black; abdomen piceous, tergites indistinctly annulated with dark ferruginous apically, apical tergite mostly ferruginous; palpi testaceous; apical half of mandibles testaceous; antennae dark brown, except outer side of basal flagellar segments light brown; tegulae brownish; legs wholly dark brown, except front tibiae and all tarsi light yellowish brown; wings very lightly tinged with brownish, veins and stigma dark brown. Mandibles much broadened apically, directed downward, their lower margin nearly straight, apex with two large teeth, their margins strongly oblique but without additional teeth. Median lobe of clypeus broadly subangulate. Antennal scrobes not margined; eyes strongly hairy. First four antennal segments in a ratio of about 28:9:7:9, segment 3 about as long as wide, segment 11 slightly broader than long. Head distinctly longer than wide. WH .93 X LH; WF .56 X WH, 1.15 X HE. Ocelli in a compact triangle far removed from eyes, front angle of ocellar triangle less than a right angle; OOL 1.8 X WOT; vertex extended far above eye tops, distance from eye tops to vertex crest about .7 X HE. Front polished, obscurely alutaceous, punctures small but sharply defined, separated by 2-3 X their own diameters. Temples polished, weakly punctate, not carinate.

Anterior face of pronotum, in front of transverse carina, strongly oblique; transverse carina fairly strong, subangulate medially, weak and extending obliquely backward on the side pieces; sides of disc weakly longitudinally humped, but not carinate; posterior margin of pronotal disc paralleled by a strongly punctate groove, behind which the surface is smooth and polished; main part of disc moderately alutaceous, with

strong punctures. Mesoscutum transversely depressed behind, the posterior part strongly alutaceous; notauli short, diverging anteriorly. Scutellum with basal pits transverse, separated medially by a thin septum. Propodeal disc about as long as wide, lateral, sublateral, and transverse carinae strong; disc with three carinae, median carina complete, other two carinae extending about .7 X the length of the disc; surface of disc smooth and shining except weakly sculptured between the carinae. Front femora 2.6 X as long as thick; middle tibiae strongly spinose. Abdomen polished, somewhat depressed apically.

Remarks. — This species is strikingly similar to *inca* in almost every respect, but the pronotum is completely without a median carina. The close resemblance of these two species demonstrates the fallacy of using the generic name *Bakeriella* for only those species possessing a median carina on the pronotum.

(8) BAKERIELLA ROSSI new species

Holotype. — ♂, COLOMBIA: 5 miles north of Anserma, Caldas, 1750 meters, 17 March 1955 (E. I. Schlinger and E. S. Ross) [CAS].

Description of type male. — Length about 3.5 mm; LFW 2.9 mm. Color black, except tip of abdomen suffused with light brown; palpi testaceous; apices of mandibles ferruginous; basal three segments of antennae bright castaneous, except scape infuscated above, third segment infuscated apically, remainder of antenna very dark brown; tegulae dark brown; legs dark brown except tarsi and tips of all tibiae light brown; fore wing lightly tinged with brownish, especially in and below marginal cell; hind wings hyaline. Mandibles with a strong apical tooth and with three very small additional teeth in a straight line. Median lobe of clypeus sharply, obtusely angulate; median carina straight in profile. Antennal scrobes margined by very delicate carinae which do not meet the eye margins; eyes very weakly hairy. First four antennal segments in a ratio of about 18:8:9:10, segment three 1.2 X as long as thick, segment eleven 1.8 X as long as thick. Head slightly longer than wide, WH .93 X LH; WF .58 X WH, 1.17 X HE. Ocelli in a compact triangle, front angle approximately a right angle; OOL about 1.4 X WOT; vertex forming an even arc considerably above eye tops, distance from eye tops to center of vertex crest equal to about .75 X HE. Front shining, weakly alutaceous, very weakly punctate; temples not strongly developed, not carinate.

Pronotum with a strong, nearly straight transverse carina; sides of disc carinate in front, but the carinae fading out on the posterior half; disc shining, weakly alutaceous, posterior margin paralleled by a strongly punctate groove. Mesoscutum somewhat depressed on sides, notauli diverging anteriorly, reaching the anterior margins only as very thin lines. Scutellar pits bowl-shaped, slightly wider than long, separated medially by a thin septum. Propodeal disc 1.1 X as wide as long, with three discal carinae, median carina complete, the others extending about .7 X the length of the disc; surface of disc entirely covered with weak sculpturing; posterior lateral angles strongly foveolate. Fore wing with transverse median vein strongly rounded.

Paratypes. — COLOMBIA: 2 ♂♂, 3 miles west of Villaviecio, Meta, 920 meters, 11 March 1955 (E. I. Schlinger and E. S. Ross) [CAS, MCZ].

Variation. — Both paratypes are slightly larger than the type (LFW 3.1, 3.2). In both specimens the antennae are more strongly suffused with castaneous basally, one specimen having the entire basal half of the antennae bright castaneous; this same specimen has all the tibiae castaneous, and the apical third of the abdomen rather strongly suffused with dark ferruginous. Only very minor differences in body measurements or in the details of the thoracic dorsum and propodeum can be noted.

(9) *BAKERIELLA POLITA* new species

Holotype. — ♂, BOLIVIA: Coroico [Prov. La Paz] (no further data) [MCZ, No. 30,805].

Description of type male. — Length about 5 mm; LFW 3.7 mm. Black; palpi and mandibles largely testaceous; antennae wholly bright, pale castaneous, except apical five segments somewhat infuscated; tegulae testaceous; legs dark brown, except front tibiae and all tarsi pale castaneous; wings faintly tinged with yellowish brown, veins amber. Mandibles with five teeth, the apical tooth strong, the other four teeth very small, subequal. Median lobe of clypeus obtusely subangular, actually slightly rounded, its median carina weakly arched in profile. Antennal scrobes carinate; eyes glabrous. First four antennal segments in a ratio of about 13:5:6:8, segment three 1.2 X as long as thick, segment eleven 1.4 X as long as thick. Head unusually elongate, WH .88 X LH; WF .60 X WH, 1.22 X HE. Ocelli in a compact triangle far above eye tops, front angle of ocellar triangle less than a right angle; OOL 1.35 X WOT. Vertex rather

narrowly rounded off far above eye tops, distance from tops of eyes to vertex crest nearly equal to HE; temples not well developed, not carinate. Front strongly polished, non-alutaceous, punctures small, separated by 3-5 X their own diameters.

Pronotal disc with a strong, weakly arching, transverse anterior carina, sides of disc sharp but not actually carinate; posterior margin of pronotum paralleled by a weak impression which is not distinctly punctate or foveolate; major part of disc alutaceous, moderately shining, the punctures rather weak. Mesoscutum weakly alutaceous, weakly punctate; notauli strong on posterior half, reaching anterior margin as very thin lines. Scutellar pits transverse, separated by a thin septum. Propodeal disc very slightly wider than long, with three discal carinae, median carina complete, the other two carinae incomplete, converging behind; surface strongly transversely striate between the carinae, elsewhere smooth and shining, except foveolate along inner side of lateral carinae.

Paratypes.—PERU: 2 ♂♂, Cosnipata-Ebene, Dept. Cuzco, 1000 meters elevation, 12 Mar. 1900 and 1 May 1901 (Garlepp) [Berlin Museum]; 1 ♂, Marcapata (Standinger) [Berlin Museum].

Variation.—The two paratypes from Cosnipata-Ebene are slightly larger than the type (LFW 4.3 mm in both), the paratype from Marcapata smaller (LFW 3.5 mm). All three paratypes have the head somewhat less strongly produced above the eye tops (WH .92-.94 X LH), but they are otherwise strikingly similar in almost every detail. WF varies from 1.05 to 1.20 X HE, OOL from 1.30 to 1.45 X WOT. These three paratypes are part of the type series of Kieffer's *Epyris montivagus*, but they are generically distinct from the type and most of the paratypes of that species, which is a true *Epyris*.

(10) *BAKERIELLA RUFOCAUDATA* new species

Holotype.—♂, COLOMBIA: NW Sierra Nevada de Santa Marta, 4000-8000 feet elevation, 20 July 1928 (P. J. Darlington, Jr.) [MCZ, No. 30,806].

Description of type male.—Length about 5 mm; LFW 3.9 mm. Head and thorax shining black; first three segments of abdomen and base of fourth dark reddish brown, remainder of abdomen bright rufo-testaceous; palpi straw-colored; apical third of mandibles testaceous; antennae dark brown, except second segment pale castaneous, scape suffused with blackish; tegulae dark brown; legs dark brown except tarsi and

tips of tibiae light yellowish brown, wings subhyaline, veins and stigma brownish. Mandibles with five teeth, the basal four teeth small. Clypeus rather sharply angular; median carina somewhat arched in profile. Antennal scrobes carinate; eyes with only a few weak hairs. Antennae elongate, first four segments in a ratio of about 13:5:7:8, segment three 1.6 X as long as wide, segment eleven 2.3 X as long as wide. WH .95 X LH; WF .58 X WH, 1.18 X HE. Front angle of ocellar triangle about a right angle; OOL 1.2 X WOT. Vertex broadly rounded; distance from eye tops to vertex crest equal to not much more than .6 X HE; temples not carinate. Front strongly polished, very obscurely alutaceous, punctures small, separated by 2-3 X their own diameters.

Pronotal disc also shining, slightly more evidently alutaceous than front; disc with a strong transverse carina in front, sides subcarinate near the front, elsewhere merely somewhat prominent; posterior margin paralleled by a shallow groove which is not distinctly punctate or carinate. Notauli diverging anteriorly, reaching anterior margin of mesoscutum only as thin lines. Scutellar pits transverse, almost quadrangular, separated by a thin septum. Propodeal disc very slightly wider than long, with three discal carinae, only the median carina complete, surface between the carinae with some very irregular transverse striae; remainder of disc shining and with only some very weak sculpturing. Subgenital plate rounded apically; parameres broad, obliquely subtruncate, strongly setose.

Paratype. — COSTA RICA: ♂, Santa Clara de San Carlos, Alajuela Prov., 17 Feb. 1964 (H. E. Evans) [MCZ].

Variation. — The paratype differs from the type in several details. The mandibles are testaceous except at the extreme base and apex; the first three antennal segments are testaceous, the remainder of the antennae rufo-testaceous, rather strongly infuscated on the apical half; the tibiae are mostly testaceous like the tarsi; and the fore wings are lightly infuscated, especially on the apical half. WH is .97 X LH, WF 1.07 X HE, OOL 1.35 X WOT. The antennae are somewhat shorter than in the type, segment three being only 1.2 X as long as wide, segment eleven 2.1 X as long as wide. There are no important differences in sculpturing, and it seems to me very probable that the two specimens are conspecific despite the several minor differences.

(11) BAKERIELLA INCONSPICUA new species

Holotype. — ♂, PANAMA: Corozal, Canal Zone, March 1912 (A. Busck) [USNM, No. 64,998].

Description of type male.—Length 3.6 mm; LFW 2.6 mm. Head and thorax black; abdomen dark brownish-fuscous except first sternite black; palpi and greater part of mandibles light castaneous; antennae light castaneous except rather strongly infuscated on apical half; tegulae light brown; coxae and femora dark brown, trochanters, tibiae, and tarsi light yellowish brown; fore wing lightly tinged with brownish around and below radial vein, veins and stigma brownish. Mandibles with five teeth, basal three teeth rather small. Median lobe of clypeus broadly, obtusely angulate, its sides somewhat rounded; median carina not arched in profile. Antennal scrobes margined by carinae; eyes with scattered short hairs. First four antennal segments in a ratio of about 19:7:10, segment three about 1.2 X as long as thick, segment eleven about 1.8 X as long as thick; flagellar pubescence semi-erect, longest setulae about one-fourth as long as width of flagellum. Head about as wide as high; inner orbits strongly converging below, WF .53 X WH, equal to HE. Front angle of ocellar triangle less than a right angle; OOL 1.4 X WOT; vertex very broadly rounded, distance from eye tops to vertex crest equal to not much more than half HE. Front moderately shining, rather strongly alutaceous, punctures small and rather indistinct; temples not strongly developed, not carinate.

Pronotal disc rather flat, subquadrangular, with a strong transverse carina anteriorly, sides margined with low, rounded ridges which become indistinct as they approach the posterior margin; the two side-ridges are subparallel, the disc between them 1.4 X as wide as long; posterior margin paralleled by a shallow, punctate groove, behind which the margin is smooth and polished; major part of disc strongly alutaceous, the punctures rather weak. Mesoscutum somewhat depressed on posterior half, this half also more strongly alutaceous and with a few small punctures; notauli strong on posterior half, reaching anterior margin only as very thin lines. Scutellar pits transverse, separated by a thin septum. Propodeal disc 1.1 X as wide as long; median carina complete, paralleled by two additional carinae which extend only .7 X the length of the disc, surface obscurely transversely striate between these carinae, elsewhere polished, with only very weak sculpturing; lateral carinae strong, sublaterals rather weak, posterolateral angles strongly foveolate. Mesopleurum alutaceous, the pits and ridges more prominent than usual in this genus.

Paratypes. — VENEZUELA: 1 ♂, Caipe, E. Barinas, Jan. 1943 (P. Anduze) [USNM]. PANAMA: 1 ♂, Barro Colorado Island, Canal Zone, 17 Aug. 1956 (C. W. Rettenmeyer; from over swarm raid of *Eciton burchelli*) [USNM]. COSTA RICA: 3 ♂♂, 5 mi. N. Quesada, Alajuela Prov., 20 Feb. 1964 (H. E. Evans) [MCZ]. MEXICO: TABASCO: 2 ♂♂, Teapa, Feb., Mar. (H. H. Smith) [BMNH].

Variation. — The seven paratypes vary slightly in size (LFW 2.2-2.7 mm) but show little variation in color except that the scape is weakly infuscated in the Mexican specimens. In the Venezuela specimen and that from Barro Colorado Island the antennae are slightly more compact than in the type, the third segment being no longer than thick, the eleventh segment about 1.2 X as long as thick. The Mexican and Costa Rican specimens have the front rather strongly shining and weakly alutaceous, the thoracic dorsum somewhat less strongly alutaceous than in the remainder of the series. WF varies from 1.0 to 1.15 X HE, OOL from 1.35 to 1.50 X WOT.

(12) *BAKERIELLA FLORIDANA* new species

Holotype. — ♂, FLORIDA: Paradise Key, Dade Co., Feb. (year not stated) (Brooks) [MCZ, No. 30,807].

Description of type male. — Length 3.1 mm; LFW 2.1 mm. Head and thorax black, abdomen dark brown, shining; palpi straw-colored; mandibles testaceous; first two antennal segments testaceous, next three segments brownish above, rest of antenna dark brown; tegulae testaceous; legs testaceous except front coxae strongly infuscated; wings hyaline, veins and stigma brownish. Mandibles with five teeth, basal three teeth small. Median lobe of clypeus rather sharply, obtusely angular; median carina somewhat arched in profile. Antennal scrobes carinate; eyes with sparse, short hairs. First four antennal segments in a ratio of about 17:7:6:8, segment three about as long as thick, segment eleven about 1.3 X as long as thick. Head about as wide as high; inner orbits strongly converging below, WF .54 X WH, 1.08 X HE. Ocelli in about a right triangle; OOL 1.12 X WOT; vertex broadly rounded, distance from eye tops to vertex crest equal to not much over half HE; temples not carinate. Front strongly alutaceous, rather weakly shining, obscurely punctate.

Pronotal disc with a strong transverse carina in front, sides subcarinate in front, less so behind, these indistinct ridges divergent behind; disc alutaceous, weakly punctate, posterior margin

narrowly raised, preceded by a shallow groove which is only rather indistinctly punctate. Mesoscutum wholly alutaceous, notauli strong on posterior half, reaching anterior margin only as thin lines. Scutellar pits transverse, separated by a thin septum. Propodeal disc as long as wide, with three discal carinae, the median carina complete; disc alutaceous, with weak transverse striae between the carinae; posterolateral angles less strongly foveolate than in the preceding species. Mesopleurum alutaceous, not strongly sculptured. Transverse median vein of fore wing rather weakly arched. Genitalia as shown in Figure 84.

Allotype. — ♀, same data as type [MCZ].

Description of allotype female. — Length 3.4 mm; LFW 2.4 mm. Head and thorax black, abdomen dark reddish brown, shining, somewhat paler toward the apex; palpi straw-colored; mandibles testaceous, the teeth rufous; scape testaceous, rest of antenna pale castaneous; tegulae testaceous; legs testaceous except front coxae infuscated at base; wings hyaline, veins and stigma brownish. Mandibles with five teeth, basal three teeth very small. Clypeus as in male. Eyes more strongly hairy than in male; antennal scrobes not carinate. Third antennal segment much shorter than second or fourth, wider than long; eleventh segment barely longer than wide. Head considerably longer than wide, WH .86 X LH; WF 7.62 X WH, 1.33 X HE. Front angle of ocellar triangle slightly less than a right angle; OOL 1.6 X WOT. Vertex broadly rounded off a distance above eye tops nearly equal to HE; temples not carinate. Front shining, moderately alutaceous, with small, widely spaced punctures.

Features of pronotum about as in male except transverse carina not quite as strong, sides more rounded, not subcarinate. Mesoscutum and scutellum as in male. Propodeal disc only .9 X as wide as long, with three discal carinae of which only the median is complete, disc wholly covered with rather weak transverse striations; lateral carinae strong, posterolateral angles foveolate. Front femora 2.3 X as long as their maximum width; middle tibiae strongly spinose.

Paratypes. — FLORIDA: 2 ♂♂, same data as type [MCZ]; 1 ♂, same locality but collected 21 Feb. 1919 (Schwarz and Barber) [USNM].

Variation. — The three male paratypes are all slightly smaller than the type (LFW 1.9-2.0 mm). They show few differences in color except that the specimen collected by Schwarz and Barber

has the entire basal half of the antennae testaceous (this specimen is lacking the abdomen). In the paratype series WF varies from .98 to 1.08 X HE, OOL from 1.10 to 1.15 X WOT.

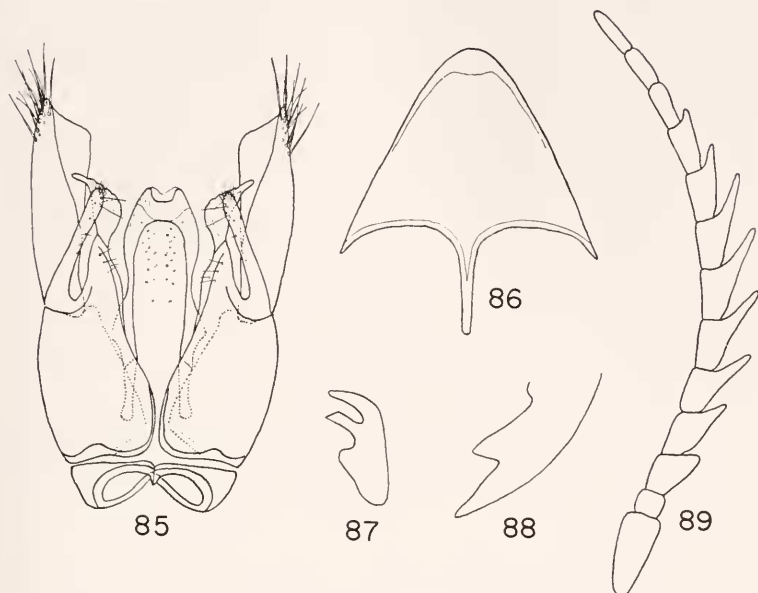
7. Genus CALYOZINA Enderlein

Calyozina Enderlein, 1912, p. 263 (type species *Calyozina ramicornis* Enderlein, monobasic). —Kieffer, 1914, pp. 429-430.

Generic characters (of male; female unknown). — Small wasps (about 5-6 mm), of predominantly black coloration. Mandibles slender, with two large apical teeth; clypeus with an angular median lobe which is weakly elevated medially, without lateral lobes; antennae arising very slightly below level of bottoms of eyes, sockets as in *Epyris*; antennae with 13 distinct segments, segment three longer than two, simple or slightly produced apically on the under side; segments four through ten somewhat more strongly produced beneath, processes on segments five through eight 0.2-1.0 X as long as the length of the segment proper, last three antennal segments simple; eyes glabrous; vertex not sharply margined. Pronotal disc not margined anteriorly or laterally, but the anterolateral corners sometimes armed with a conical process; notauli broad, diverging anteriorly; scutellum as in *Aspidepyris*; propodeum with several discal carinae, the median carina extending down the declivity, posterolateral angles foveolate; claws bifid, also with an additional tooth at the base. Wings fully developed, venation of fore wing as figured for the preceding genus (Fig. 82). Abdomen stout, shining; subgenital plate subtriangular, its apex rounded; genitalia as described for *Aspidepyris*, the cuspides elongate, simple, and unbranched, bearing a few apical setae. (Figs. 85-89.)

Remarks.—The above generic description is based entirely on the two Neotropical species here assigned to this genus. I have not seen specimens of the type species, *ramicornis*, which is from Formosa. I am not certain that I am placing our two species correctly, as they disagree with Enderlein's description in several respects. According to Enderlein the third to the twelfth antennal segments bear processes which are longer than the length of the segment. The prothorax is said to be sharp-edged, but Enderlein does not indicate that the anterior angles are prominent. Clearly our species cannot be placed in the genus *Calyoza*, since in this genus the third antennal segment is a mere ring-joint no longer than the second segment. There is no question that *Calyoza*, *Calyozina*, *Calyozella*, and *Paracalyoza*

are closely related. It seems unwise to describe a new genus for our two Neotropical species, for it is possible that all these genera may ultimately be reduced to one, or for that matter to mere species-groups or subgenera of *Epyris*.



Calyozina neotropica n. sp., holotype male. Fig. 85. Genitalia. Fig. 86. Subgenital plate. Fig. 87. Hind tarsal claw. Fig. 88. Mandible. Fig. 89. Antenna.

Biology. — *Unknown.*

Distribution. — Formosa, Panama, and Brazil.

Included species. — Only the type species, *ramicornis*, and the two Neotropical species described below. These two species may be separated by the following couplet (only males are known):

- Antennae rather stout and with the middle flagellar segments only weakly produced apically; scutellar pits oblique, elongate, connected by a thin, shallow groove; pronotum merely somewhat prominent anterolaterally (Brazil) (1) *amazonica* n. sp.
- Antennae more slender and with the processes of the middle flagellar segments nearly as long as the segments proper; scutellar pits subcircular, not distinctly connected; pronotum anterolaterally with conical processes (Panama) (2) *neotropica* n. sp.

(1) CALYOZINA AMAZONICA new species

Holotype. — ♂, BRAZIL: Santarem (no further data) [USNM, No. 67,127].

Description of type male. — Length 6 mm; LFW about 4 mm. Head and thorax black, with very faint olive-green reflections, especially on the front, the propodeum jet black; abdomen very dark reddish brown, slightly paler basally and apically; mandibles testaceous, teeth rufous; clypeus piceous, but the front suffused with testaceous around the antennal sockets; antennae light rufo-castaneous except the apical third infuscated; legs bright, pale castaneous except the coxae nearly black, the hind femora weakly infuscated; wings in poor condition but apparently somewhat luteous. Features of head as described under generic heading; first four antennal segments in a ratio of about 13:7:9:12, the third and fourth segments gradually expanded apically and weakly produced beneath; segments 5-10 each with a somewhat more prominent apical process, but the process not more than .2-.3 X as long as the segment proper. Front shining, weakly alutaceous, with small, sharply-defined punctures which are separated by 1-3 X their own diameters. Head as wide as high; WF .57 X WH, 1.0 X HE; OOL 1.2 X WOT.

Median length of pronotum 1.2 X that of mesoscutum; pronotal disc rather prominent anterolaterally, but not actually produced; disc alutaceous, moderately shining, wholly covered with small punctures. Mesoscutum more strongly shining, its punctures somewhat stronger and more widely spaced; scutellar pits elliptical, oblique, connected by a thin, shallow groove. Propodeal disc 1.6 X as wide as its median length; with five strong discal carinae, the sublateral carinae barely developed, the disc weakly transversely striate between the carinae; side-pieces of propodeum longitudinally striate. Abdomen robust, shining.

Remarks. — The extreme tip of the abdomen of the type has been destroyed, apparently by dermestids. There are no other known specimens.

(2) CALYOZINA NEOTROPICA new species

Holotype. — ♂, PANAMA: Close's, Cano Saddle, Canal Zone, June 1923 (M. F. Close) [USNM, No. 67,128].

Description of type male. — Length 5 mm; LFW 3.6 mm. Head and thorax black; abdomen with basal two segments black,

also median basal portion of third tergite, rest of abdomen ferruginous; mandibles light brown, teeth rufous; antennae castaneous, except scape and apical few segments somewhat infuscated; coxae nearly black, femora and middle and hind tibiae dark brown, front tibiae and all the tarsi light yellowish brown; wings lightly tinged with brownish, anterior portion of fore wing faintly luteous, veins and stigma dark brown. Features of head as described under the generic heading; first four antennal segments in a ratio of about 15:6:8:12, the third and fourth segments measured from their base to the apex of the apical process; segments 5-8 with their apical processes nearly as long as the segments proper; segment eleven 2.7 X as long as wide; flagellar pubescence brownish, semi-erect, of moderate length (Fig. 89). Front shining, weakly alutaceous, punctures small but sharply defined, separated by 1-3 X their own diameters. Head 1.01 X as wide as high; WF .61 X WH, 1.10 X HE. Ocellar triangle compact, front angle less than a right angle; OOL 1.07 X WOT.

Pronotal disc about half as long as its maximum, posterior width, 1.6 X length of mesoscutum; anterolateral angles of disc subdentate; surface of pronotum weakly alutaceous, with sparse small punctures. Mesoscutum strongly polished, barely alutaceous; notauli complete, wide, tapering and diverging anteriorly; parapsidal furrows also quite wide, tapering anteriorly. Scutellum with a pair of large, bowl-shaped pits, slightly longer than wide, separated from each other by slightly more than their own diameters. Propodeal disc 1.7 X as wide as its median length; lateral and posterior carinae very strong, sublaterals not developed, but extreme sides of disc depressed and foveolate; disc with three strong carinae which reach the posterior carina, also with a pair of weaker incomplete carinae close beside the median carina; disc with irregular sculpturing which tends to form weak transverse striae; side-pieces of propodeum longitudinally striate. Other features as described under generic heading; genitalia as in Figure 85.

8. Genus *HOLEPYRIS* Kieffer

Holepyris Kieffer, 1904b, p. 390 (type species *H. africanus* Kieffer, designated by Kieffer, 1906a). —Kieffer, 1905a, p. 121. —Kieffer, 1906a, pp. 340-369 (European spp.). —Kieffer, 1908a, pp. 29-30. —Kieffer, 1914, pp. 371-391 (spp. of world). —Berland, 1928, pp. 118-121 (French spp.).

Rysepyris Kieffer, 1906a, p. 341 (type species *Holepyris* (*Rysepyris*) *numidicus* Kieffer, designated by Kieffer, 1914; proposed as subgenus of *Holepyris*; new synonymy). —Kieffer, 1914, pp. 397-398 (generic status).

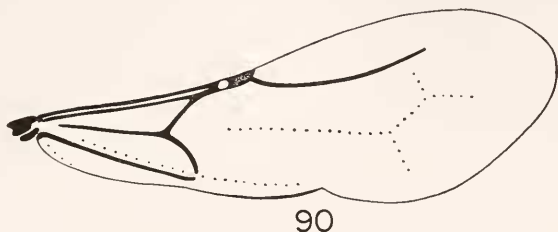
Miscepyris Kieffer, 1913, p. 108 (type species *Holepyris remotus* Kieffer, designated by Kieffer, 1914; new synonymy). —Kieffer, 1914, pp. 398-400.

Parepyris Brèthes, 1913, p. 87 (type species *P. sylvanidis* Brèthes, monobasic; new synonymy) (not *Parepyris* Kieffer, 1913, p. 108).

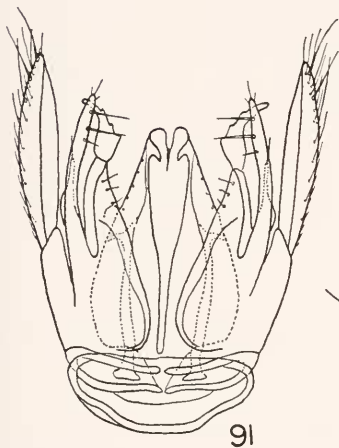
Generic characters. — Small wasps (2-8 mm); body black, brownish, or rarely partly rufous, without metallic colors. Maxillary palpi with six segments, the basal three rather short; labial palpi with three segments, the basal two short; mandibles slender, with from one to five apical teeth, in retracted position largely covered by the very large, trilobed clypeus; lateral lobes of clypeus large, rounded, exceeded in most species by the generally narrower and more acute, carinate median lobe; clypeal carina extending up lower front as a polished streak; antennae arising well below level of bottoms of eyes, arising from beneath paired prominences of the lower front; antennal scrobes not margined; antennae of male elongate, second segment more than half as long as the rather short scape, third and following segments more than twice as long as thick, covered with prominent pubescence which is sometimes erect or semi-erect; eyes hairy in most species, always rather short, not nearly reaching posterior margin of head; occipital carina present.

Pronotum much longer than mesoscutum, nearly always with a transverse carina margining the disc anteriorly; mesoscutum usually transversely impressed at least on the sides, notauli very thin, subparallel, usually incomplete, sometimes barely discernible; scutellum with a transverse groove at base, the groove often curved backward but not usually expanded on the sides; propodeal disc subquadrate, longer than wide in most species, carinate medially and laterally, disc usually also with additional longitudinal carina, posterior transverse carina sometimes weak or even absent, posterolateral corners of disc foveolate or not; mesopleurum with a pit below base of hind wings, a carina running forward from the pit, then downward and backward; claws variable, as in *Epyris*; females with the femora broadened and somewhat flattened, middle tibiae not or very weakly spinose. Wings abbreviated in females of a few species, when fully developed with the stigma rather small, radial vein very long, basal vein reaching subcosta basad of stigma by approximately

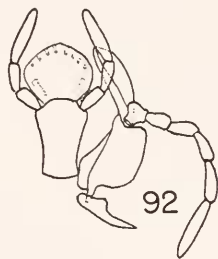
the length of the stigma (sometimes slightly more or less); discoidal vein not present; transverse median vein strongly oblique, strongly curved below. Abdomen somewhat depressed apically; male subgenital plate simple, apex more or less rounded; genitalia with parameres broad, setose, much as in *Epyris*; cuspis with a long ventral arm which bears some strong setae, with or without a short dorsal arm; aedoeagus broad and fairly long. (Figs. 90-93.)



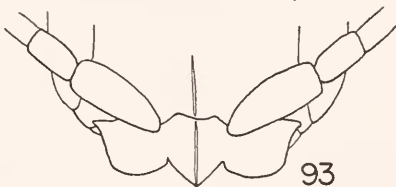
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91



92



93

Holepyris spp. Fig. 90. *H. marylandicus* Fouts, fore wing, male. Fig. 91. Same species, male genitalia. Fig. 92. *H. subapterus* (Melander and Brues), labium and maxilla, female. Fig. 93. *H. marylandicus* Fouts, anterior portion of head, male.

Remarks.—This large genus is probably related to *Rhabdepyris* and is possibly a derivative of that genus. It is a very distinctive genus by virtue of the trilobed clypeus, the reduced notauli, and the fact that the basal vein reaches the subcosta well

basad of the stigma. These characteristic features also occur in Kieffer's genera *Rysepyris* and *Misepyris*, which in my opinion cannot be retained even as subgenera; I have seen the type of the type species of *Misepyris*, but I have not seen specimens of the type species of *Rysepyris*.

Biology.— These wasps are usually found on or close to the ground or under the bark of trees. Muesebeck and Walkley (1951, p. 730) record *Catogenus rufus* (Fabr.), a cucujid beetle occurring under bark, as host of *Holepyris coronatus* (Ashmead). These authors also record as host of *H. subapterus* (Melander and Brues) the bee *Halictus pruinosus* Robertson. However, Melander and Brues merely indicated that the wasps were found running about among the burrows of this bee, so there is no certainty that they were attacking the bee larvae. The fact that these wasps remain close to the substrate in which they live probably accounts for the fact that they are less common in collections than some other Epyrinae. I have taken occasional specimens on honeydew, but they seem to visit honeydew less frequently than, for example, the species of *Epyris* and *Anisepyris*.

Certain species of this genus occur mainly in buildings, where they attack the larvae of Coleoptera infesting grain. Brèthes reported *sylvanidis* from *Silvanus surinamensis* (Cucujidae) in Argentina. *H. sylvanidis* has been distributed throughout the world in commerce, although it has generally been called *zeae* Turner and Waterston, which is a later name. Gahan (1930) and Muesebeck and Walkley (1951) list as probable hosts *Laemophloeus ferrugineus* (Cucujidae), *Sitophilus oryzae* (Curculionidae), and *Tribolium* spp. (Tenebrionidae). This wasp has usually been placed in the genus *Rhabdepyris*, but it is a *Holepyris* as the genus is here defined.

A second species of *Holepyris* occurring in buildings and also widely distributed in commerce is *H. hawaiiensis* (Ashmead). This species occurs in England and Hawaii, and it is reported by Richards (1939) from cacao from W. Africa, St. Lucia, Venezuela, and Ceylon. Probably this species should be regarded as a member of the American fauna, but I have seen no specimens definitely established as representing *hawaiiensis*. This species is reputed to attack lepidopterous larvae (*Plodia* and *Ephestia*), but I do not consider it certain that these are the normal hosts. Bridwell (1920) was able to rear the species on three species of Microlepidoptera in the laboratory. The

wasp stings the caterpillar in the mouth region, feeds on it, then drags it around before laying a single egg on the abdomen. Bridwell found that the females require carbohydrates in addition to the fluids of the host. Considering the fact that Bridwell, in the same paper, reports that under artificial conditions he was able to rear *Scleroderma immigrans* on insects of several orders (even termites!), I do not consider that the true hosts of *Holepyris hawaiiensis* are necessarily Lepidoptera, although Bridwell does intimate that he and F. X. Williams have reason to believe that this is so. Bridwell also mentions that Silvestri found that an Italian species lays a single egg upon a caterpillar, but I have been unable to locate this reference. *H. hawiensis* is reported to sting man readily and to cause a lasting irritation to the skin (Pemberton, 1932).

Distribution. — This genus is well represented in the Palaearctic, Ethiopian, Oriental, and Australian regions. There are numerous species in North and Central America and several in the West Indies. I have seen only a few specimens from South America, and my impression is that the genus is not well represented on that continent.

Included species:

United States

coronatus (Ashmead), 1893, p. 47; ♂, Maryland.

floridanus (Ashmead), 1887, p. 76; ♂, Florida.

haemorrhoidalis (Kieffer), 1904a, p. 528; ♀, Texas (new combination).

marylandicus Fouts, 1928, p. 125; ♀, Maryland.

punctifrons Fouts, 1927, p. 166; ♀, Florida.

subapterus (Melander and Brues), 1903, p. 23; ♀, Massachusetts.

sylvanidis (Brèthes), 1913, p. 87; ♀. ♂. Argentina (reported from many parts of the U.S., Europe; probably cosmopolitan) (synonym: *zeae* Turner and Waterston, 1921, p. 29; new synonymy) (new combination).

Mexico and Central America

bakeri Kieffer, 1906b, p. 247; ♀, Nicaragua.

cameroni Evans, new name for *Epyris montezuma* Cameron, 1897, p. 276 (*nec* Cameron, 1888b, p. VII); ♀, Mexico (Orizaba).

longicollis (Cameron), 1888a, p. 455; ♀, Mexico (Cordoba).

remotus Kieffer, 1911, p. 218; ♀, Mexico (Atoyac, Veracruz).

West Indies

gracilis Kieffer, 1908b, p. 17; ♀, Cuba.

incertus (Ashmead), 1894, p. 189; ♂, St. Vincent.

pygmaeus (Ashmead), 1895b, p. 787; ♂, Grenada.

South America.—One species, *sylvanidis* Brèthes, was described from Argentina (see above, under U.S.), and Richards (1939) mentions *hawaiiensis* (Ashmead) as being found in cacao from Venezuela. There is at least one other apparently undescribed South American species.

9. Genus *LAELIUS* Ashmead

Laelius Ashmead, 1893, p. 50 (type species *Laelius trogodermatis* Ashmead, original designation). —Ashmead, 1902, pp. 271, 272. —Kieffer, 1906a, pp. 418-422 (European spp.). —Kieffer, 1908a, p. 38. —Brues, 1910b, p. 46 (key to U.S. spp.). —Kieffer, 1914, pp. 278-282. —Berland, 1928, pp. 122-124 (French spp.). —Muesebeck, 1939, pp. 171-176 U.S. spp.). —Muesebeck and Walkley, 1951, p. 728.

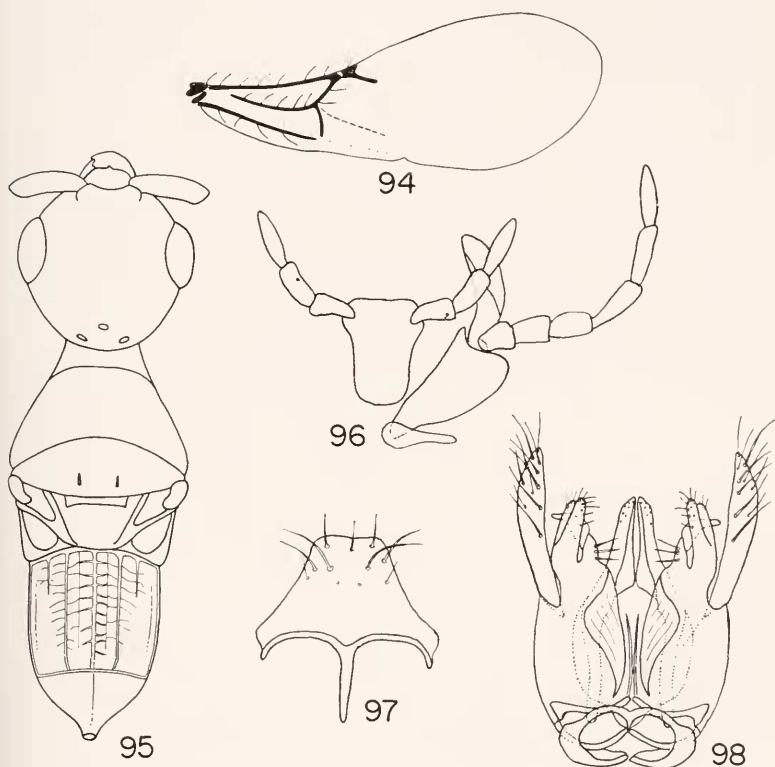
Bethylus Ashmead, 1893, pp. 52-54 (not *Bethylus* Latreille; misidentification). —Ashmead, 1902, pp. 271-272.

Paralaelius Kieffer, 1905a, p. 129 (type species *Bethylus pedatus* Say, designated by Kieffer, 1914; synonymy by Muesebeck and Walkley, 1951). —Kieffer, 1908a, p. 39. —Kieffer, 1914, pp. 282-289.

Generic characters.—Very small wasps (1.7-3.5 mm) of black coloration; head, thorax, and often the femora clothed sparsely with strong, black setae, major veins of wing also clothed with prominent black setae. Maxillary palpi with six segments, but the basal three segments very short; labial palpi with three segments; mandibles with four or five apical teeth; clypeus with the median lobe somewhat rounded, but usually with a small median tooth formed by the end of the median carina; clypeus without lateral lobes; eyes glabrous, small, well removed from base of mandibles and from posterior margin of head; antennae arising well below bottoms of eyes, simple, 13-segmented; occipital carina rather weak.

Pronotum with smooth contours, the disc rounded off anteriorly and laterally, not carinate, much broadened behind; notauli not or weakly indicated in female, tending to be stronger in male, but very thin, rarely complete; scutellum with a transverse groove at base; propodeal disc carinate laterally and posteriorly, median carina complete and extending down declivity in females, sometimes much reduced in males, disc usually with additional longitudinal carinae in females, posterolateral angles

sometimes foveolate; mesopleurum with a small pit opposite bases of hind wings, otherwise weakly sculptured; femora somewhat swollen and flattened, especially in female; claws dentate. Fore wing with stigma very small, giving rise to a short, oblique radius, at most slightly longer than the short basal vein, the latter reaching the subcosta close to the base of the stigma. Male subgenital plate with a median basal stalk, apex more or less truncate. Genitalia bearing considerable resemblance to those of *Epyris* and related genera; parameres short and broad, strongly setose; cuspides divided into dorsal and ventral arms, also with strong setae; aedoeagus rather broad. (Fig. 94-98.)



Laelius spp. Fig. 94. *L. pedatus* (Say), fore wing, female. Fig. 95. Same species, head and thorax, female. Fig. 96. *L. utilis* Cockerell, labium and maxilla, male. Fig. 97. Same species, male subgenital plate. Fig. 98. Same species, male genitalia.

Remarks.—Although several authors have considered the stigma to be lacking in *Laelius*, I can see no qualitative difference in this regard from *Holepyris* and several other genera. This genus appears to me to represent a somewhat specialized offshoot of typical Epyrinae, perhaps of *Rhabdepyris*.

Biology.—These wasps are usually found in or around buildings, and their biology is fairly well known as compared to most Bethyliidae. The usual hosts are the larvae of Dermestidae, although Kieffer (1914) presented several records for larvae of other kinds of beetles. One of the earliest accounts was published by L. O. Howard in "The Insect Book" (1901, pp. 34-36), relating to *Laelius trogodermitis*, described by Ashmead as a parasite of *Trogoderma tarsale*. According to Howard, the female *Laelius* jumps upon the back of the much larger dermestid larva and eventually stings it on the venter of the thorax. Before oviposition, she pulls out the hairs of the host at the oviposition site and also "thrusts her sting into the spot several times, apparently making an orifice through which the larva . . . can thrust its head . . ." From one to six eggs may be laid on a single larva; the eggs are laid longitudinally on the venter of the abdomen, often in a double row. The larvae feed with their heads inserted through the venter, their sac-like bodies extending free of the host. According to Howard, when only one parasite larva occurs on a host, it may enter the hollowed-out skin of the host and spin its cocoon within it. Spencer (1942) found four cocoons of *Laelius* sp. inside the last larval skin of an *Anthrenus*. Krombein (1955) found a *Laelius trogodermitis* female dragging a *Trogoderma* grub over a board; he considered it probable that the *Laelius* usually encounters her host in a concealed situation and leaves it *in situ*, but in this case the grub was in the open and was being dragged by the wasp into some type of crevice. Krombein (1958) records *Trogoderma parabile* and *T. simplex* as hosts of this species.

Another North American species, *L. utilis*, was described by Cockerell from museum beetles, and is recorded by Muesebeck and Walkley (1951) from *Trogoderma versicolor*. These authors also record *Anthrenus verbasci* as host of *L. pedatus* (Say), and *Anthrenus vorax* as host of *L. voracis* Muesebeck. Back (1940) presented a brief discussion and some excellent photographs of the biology of *L. voracis*.

The European species *L. anthrenivorus* Trani was found by its describer to be attacking the larvae of *Anthrenus musacorum*,

and Vance and Parker (1932) studied this species further as a parasite of *A. verbasci*. According to Vance and Parker, females live for several weeks when given neither food nor water. This species also pulls off the hairs of the host prior to oviposition and may drag the paralyzed grub around "as if obeying an instinct to drag the prey to her lair." Vance and Parker described and figured the larva in some detail.

Further details, as well as additional references, may be found in the papers cited. Judd (1960) reports *Laelius utilis* stinging a child in Ontario, and I know of two instances of wasps of this genus stinging adults in buildings. The sting is not severe nor its effects serious.

Yamada (1955) has reported at length on the life history and development of the related wasp *Allepyris microneurus* Kieffer, which also attacks dermestid larvae.

Distribution. — Members of this genus occur in North America, Europe, North Africa, and India. In North America, the species collectively range from the southern tier of provinces of Canada south to Florida and to central Mexico.

Included species. — Six species are currently recognized in North America. Five of these were reviewed by Muesebeck (1939), whose paper remains the standard reference on the genus even though he intended it as no more than a preliminary treatment of the genus. Some of the eastern species appear to range to the Pacific, and there are some undescribed species in the Southwest. The following listing of species follows Muesebeck and Walkley (1951):

centratus (Say), 1836, p. 281; Indiana (sex ?) (also Florida, Colorado, according to Muesebeck and Walkley).

occidentalis Whittaker, 1929, p. 387; ♀, British Columbia.

pedatus (Say), 1836, p. 280; Indiana (sex ?) (widely distributed in eastern U.S., west to Colorado, south to Morelos, Mexico) (synonyms: *nubilipennis* Ashmead, 1887, *tricarinatus*, Ashmead 1893, *rufipes*, Ashmead 1893, *nigripilosus* Ashmead, 1893, *constrictus* Ashmead, 1893, *ashmeadi* Kieffer, 1908a, *fumipennis* Brues, 1910b).

trogodermatis Ashmead, 1893, p. 51; ♀, District of Columbia (also Quebec, Florida) (♂ also described).

utilis Cockerell, 1920, p. 34; ♀, Virginia (North Carolina to Ontario and Massachusetts).

voracis Muesebeck, 1939, p. 172; ♀, District of Columbia (♂ also described).

B. TRIBE CEPHALONOMIINI

Tribal characters.—Minute wasps, rarely exceeding 2.5 mm in length. Maxillary palpi with from three to five segments, labial palpi with one or two segments; antennae simple, with twelve segments; clypeus with median lobe short, bluntly rounded or truncate, sometimes indistinct; occipital carina absent. Mesosecutum without notauli; propodeum with or without a transverse carina margining the disc behind, with or without a median carina, never with discal carinae other than the median carina, posterolateral angles never foveolate; claws simple or dentate. Wings present, reduced, or absent, tegulae usually preserved at least as minute flaps in wingless forms (both sexes may be wingless); alate forms with the wings slender basally, hind wing with a very small anal lobe, apex of fore wing and apex and hind margin of hind wing fringed with fairly long, delicate setae; fore wing with subcosta strong, leading to a subtriangular or somewhat rounded prostigma which is followed by a smaller true stigma, the latter giving rise to a radial vein in some genera, but radial vein completely absent in *Cephalonomia*; median and anal veins present, very faintly indicated, or absent, when present curving up to join the prostigma; anal vein absent or very faintly indicated, costa absent; anterior margin of fore wing broadly indented at the prostigma. Abdomen relatively short and stout, slightly depressed; male genitalia with the parameres short and broad, cuspides undivided, rather broad and plate-like, bearing numerous setae, aedeagus large, bilobed apically.

Distribution.—Worldwide except in polar and subpolar regions and on some oceanic islands.

Included genera.—This tribe includes *Israelius* Richards, from southwestern Asia; *Prorops* Waterston, from Africa but introduced into South America and Java; and two closely related and widely distributed genera, *Plastanoxus* and *Cephalonomia*.

KEY TO GENERA OF CEPHALONOMIINI

1. Radial vein completely absent (Fig. 105); wings frequently absent or much reduced 3. CEPHALONOMIA Westwood, p. 155

- Radial vein present at least in part (Figs. 99, 101); wings always fully developed2
2. Front simple, not produced as below; maxillary palpi with four segments, labial with two (as in Fig. 108); propodeal disc margined behind1. PLASTANOXUS Kieffer, p. 149
- Front strongly produced below into a bifid process which overlies the antennal sockets (Fig. 102); maxillary palpi with three segments, labial with one (Fig. 104); propodeal disc not margined behind ..
.....2. PROROPS Waterston, p. 152

1. Genus PLASTANOXUS Kieffer

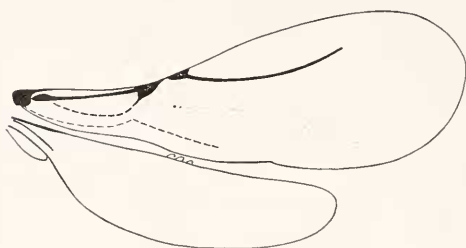
Anoxus Ashmead, 1893, pp. 67-69 (U.S. spp.; not *Anoxus* Thomson, misidentification). —Ashmead, 1902, p. 272.

Plastanoxus Kieffer, 1905b, p. 244 (type species *Anoxus chittendenii* Ashmead, designated by Gahan, 1931). —Kieffer, 1908a, p. 18. —Kieffer, 1914, pp. 449-450. —Gahan, 1931, pp. 213-218 (key to spp.). —Richards, 1939, pp. 319-321 (British spp.).

Generic characters. — Very small wasps (1.0-2.5 mm) of predominantly brown or black coloration; wings fully developed although slender basally; body setae very small. Maxillary palpi with four segments, labial palpi with two, almost exactly as figured for *Cephalonomia* (Fig. 108); mandibles with four apical teeth, the basal three teeth small; clypeus short, with a broad median lobe which is rounded apically, rather gibbous medially; eyes bare, rather small, well separated from base of mandibles and from posterior margin of head; antennae arising far below bottoms of eyes, simple, 12-segmented; front somewhat convex, but not at all produced over bases of antennae; ocelli present; occipital carina absent.

Pronotum simple, considerably longer than mesoscutum; parapsidal lines distinct but notauli absent; base of scutellum with a pair of widely separated pits or a partially divided transverse groove; propodeal disc margined laterally and posteriorly, median carina present or absent; mesopleurum simple, with a small pit below base of hind wings; femora not much swollen, tibiae without spines; claws dentate. Fore wing slender basally, considerably broadened beginning just basad of stigma; costa absent, subcosta distinct, leading to a strong prostigma narrowly separated from the small stigma; radial vein present, fairly long; median and basal veins present or obsolete, anal and transverse median veins hyaline or only very faintly indicated; hind wing slender basally, the anal lobe small, this wing with two short veins at base at least in *tarsalis* and *chittendenii* (only

one according to Richards, 1939). Abdomen of female fairly broad, slightly depressed. Male subgenital plate simple, more or less rounded apically, with a strong median basal stalk. Male genitalia (of *P. chittendenii*, the only species studied) remarkably similar to those of *Cephalonomia tarsalis* (shown in Fig. 107), the basal ring, aedoeagus, and major portion of the volsella being virtually identical. The cuspis is, however, devoid of apical setulae, although with the usual strong setae at its base. The parameres are unlike those of *Cephalonomia* in that they are deeply divided into a broad ventral and a more slender dorsal arm; in this respect they are much like those of *Scleroderma*, except that the separation into two lobes is less complete than in that genus. (Figs. 99, 100.)



99



100

Plastanozus spp. Fig. 99. *P. laevis* (Ashmead), fore wing. Fig. 100. *P. chittendenii* (Ashmead), lateral view of paramere of male genitalia, dorsal surface toward left, ventral toward right.

Remarks. — These minute wasps may be related, on the one hand, to the Epyrini and, on the other hand, to the more specialized genus *Cephalonomia*. Only a few species are known, and these are not commonly encountered.

Biology. — *P. westwoodi* is believed to be a parasite of *Laemophloeus pusillus* Schönherr, a cucujid beetle occurring in stored grain (Gahan, 1931); it has been taken in England in shipments of grain from Australia, and was originally described from Indian corn from Africa. *P. monroi* Richards was taken in a warehouse and probably also attacks beetles occurring in stored products. Gahan remarks that *P. laevis* is not known to attack insects in stored products, and Richards characterizes *laevis* and *chittendenii* as “out-of-doors species.” However, *laevis* is poorly known and one notes that the type was taken on a window. A

series of what appears to be *laevis* from Santa Catarina, Brazil [BMNH], suggests that this species, like *westwoodi*, may occur widely throughout the globe, probably distributed by man in stored grain. The final species, *chittendenii*, was described from a series reared from *Cis* sp., according to Richards "found in fungi with *Cis fuscipes* Mell."

Distribution.—Although Kieffer (1914) records the range as North America, it is unlikely that all the species are native to that area, as some appear to occur widely throughout the globe in stored products. *P. monroi* Richards was described from London from a warehouse sample of cacao from the Gold Coast, Africa.

Included species.—Only five species are known, one of which, *monroi* Richards, is not known to occur in the Americas. Our four species are listed below, and a key is presented for them; one species is described as new.

chittendenii (Ashmead), 1893, p. 68; ♂, New York (transcontinental in U.S. and southern Canada; ♀ also known).

incompletus Evans, n. sp. described below from ♀, Arizona.

laevis (Ashmead), 1893, p. 68; ♀, District of Columbia (8 ♀ ♀ from Santa Catarina, Brazil [BMNH], appear to belong to this sp.).

westwoodi (Kieffer), 1914, p. 248; ♀, Africa (♂ also known; probably cosmopolitan; occurs widely in U.S.) (synonym: *kiefferi* Gahan, 1931, p. 217 [apparently an error for *westwoodi*]).

KEY TO SPECIES OF *PLASTANOXUS*

1. Fore wing with a closed median cell, the submedian cell also enclosed at least by faintly indicated veins; propodeum with median carina developed at least partially, often complete 2
Fore wing with no closed cells whatever; median carina of propodeum absent or weakly indicated 3
2. Radial vein long, continuous; head of female subcircular, only slightly longer than wide *laevis* (Ashmead)
Radial vein incomplete basally, i.e., not connected to stigma although present on outer part of wing; head of female rectangular, much longer than wide *incompletus* n. sp.
3. Radial vein extending a little more than half the distance from stigma to apex of wing, slightly curved; head of female rectangular, more than 1.5 X as long as wide *westwoodi* (Kieffer)

Radial vein extending distinctly less than half the distance from stigma to apex of wing, practically straight on the outer part; head of female less parallel-sided, much less than 1.5 X as long as wide
 *chittendenii* (Ashmead)

PLASTANOXUS INCOMPLETUS new species

Holotype. — ♀, ARIZONA: Mesa, Maricopa Co., 7 Oct. 1960 (G. Butler; sucked from cotton) [MCZ, No. 30,808].

Description of female type. — Length 1.9 mm; LFW 1.4 mm. Black; antennae dark brown; mandibles light brown, the teeth somewhat rufous; legs dark brown except front tibiae and all the tarsi testaceous; wings hyaline, the veins, stigma, and prostigma brownish. Head elongate, parallel-sided except sides arcuately convergent at top to a straight vertex, head 1.45 X as long as wide. Eyes not at all protruding from sides of head; WF 1.25 X HE; distance from eye to base of mandible about one-fourth HE, distance from eye to vertex crest about 1.5 X HE. Ocelli small, in a right triangle, the posterior ocelli removed from the vertex crest by slightly more than WOT; OOL more than twice WOT. First four antennal segments in a ratio of about 25:9:4:5, segment three barely longer than wide, but fourth segment and those beyond distinctly longer than wide.

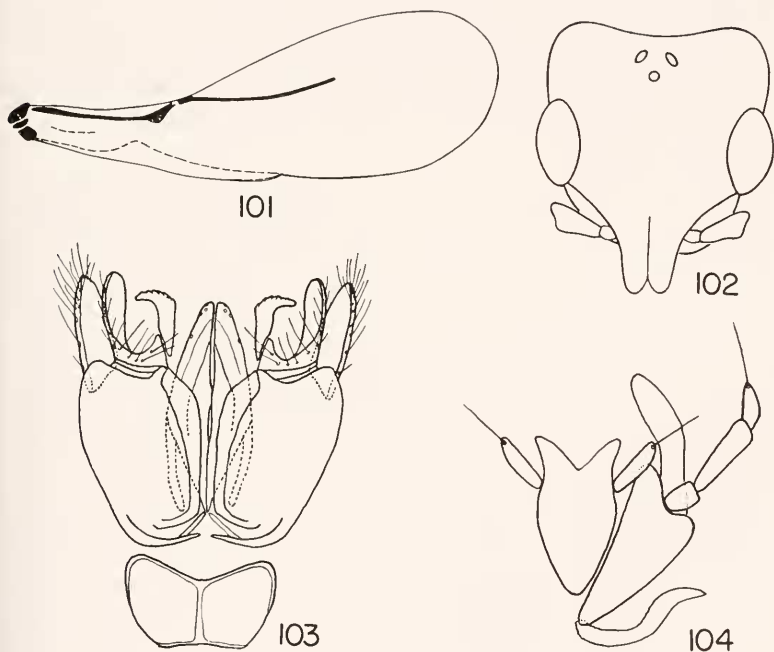
Head and thoracic dorsum somewhat shining, wholly alutaceous, obscurely punctate. Pronotal disc, mesoseutum, scutellum, and propodeal disc in a ratio of 18:9:10:20 (measured along midline). Scutellum with a pair of round basal pits connected by a groove. Median carina of propodeum complete to the transverse carina, although rather indistinct at its base, where there are some additional, weak, longitudinal rugae. Wings with the median and submedian cells both strongly outlined by well-formed veins; radial vein absent basally, but its outer part present as a distinct vein, the preserved portion about as long as the distance from the stigma to its base (i.e., the obsolete portion). Abdomen stout, shining.

Remarks. — This species is of interest in demonstrating the close relationship between *Plastanoxus* and *Cephalonomia*. The radial vein is half obliterated; if it were all gone, this species would be placed in *Cephalonomia* as a close relative of *tarsalis*.

2. Genus PROROPS Waterston

Prorops Waterston, 1923, pp. 112-114 (type species *P. nasuta* Waterston, monobasic).

Generic characters.— Very small wasps, about 2 mm long, of dark brown coloration; fully winged, wings shaped as in the preceding genus. Maxillary palpi with three segments, the second segment much longer than the first or third; labial palpi with one segment; mandibles relatively very wide and short, with three teeth and a very weak indication of a fourth tooth basad of these; eyes covered with short hairs; malar space short, but eyes well removed from posterior margin of head, which is somewhat concave; lower part of front produced into a very strong, bifid process which overlies the base of the antennae and extends well beyond the clypeus, which is broadly truncate, short; in lateral view, the frontal process is flat-topped except reflexed at the tip, and the mandibles are directed obliquely downward, leaving a wide space between the mouth-parts and the frontal process, partially filled by the somewhat vertical clypeus; antennae simple, 12-segmented, bearing large sensoria; occipital carina absent.



Prorops nasuta Waterston. Fig. 101. Fore wing, female. Fig. 102. Anterior aspect of head, female. Fig. 103. Male genitalia. Fig. 104. Labium and maxilla, female.

Pronotum and mesoscutum much as in *Plastanoxus*, except the latter with neither the notauli nor the parapsidal furrows distinct; scutellum separated from scutum by a thin line, without basal pits or a transverse furrow; propodeum completely without carinae, the dorsal surface rounded smoothly onto the steep, almost vertical declivity; mesopleurum simple, with a small pit on upper part; femora slightly swollen, tibiae without spines, although middle tibiae with dense, short, stiff setae on upper surface; claws simple. Wings slender basally, fore wing expanded beyond stigma, as in *Plastanoxus*, also fringed as in that genus; fore wing with only the subcosta present, leading to a prostigma which is larger than the stigma, stigma emitting a long, slightly curved radius, median and anal veins indicated only by very faint streaks; hind wing with anal lobe very small. Abdomen sessile, fusiform, rather strongly depressed. Male genitalia with the parameres relatively short and broad; cuspides undivided, forming broad plates; aedoeagus rather broad, not differing notably from that of *Holepyris* and other Epyrini; basal ring unusually large. (Figs. 101-104.)

Remarks.—Waterston's description of this genus and its single known species is detailed and well-illustrated. Waterston was undoubtedly correct in suggesting that the genus is related to *Cephalonomia*.

Biology.—*Prorops nasuta* Waterston is an important natural enemy of the coffee berry-borer, *Stephanoderes hampei* Ferr. (Scolytidae). It is one of the very few bethylids to have been employed in biological control work, having been introduced from Africa into Brazil and into Java for the control of this insect. Hargreaves (1926) discussed the biology of *Prorops nasuta* and its host in Uganda, Hempel (1934) presented an account of its successful introduction into Brazil, including a list of localities where it was released, and de Toledo (1942) presented further details on its life history and development.

According to Hargreaves, the female *Prorops* enters an infested coffee berry and spends most of her life there, feeding on immature beetle larvae and laying her eggs on the full-grown larvae. The egg is laid singly on the ventral surface of the thorax. The wasp larva feeds externally for only three or four days, then spins its cocoon in the berry; the adult wasp emerges from the cocoon about three weeks later. Adult females live in captivity about 50 days, laying a maximum of 37 eggs, at a rate of about one a day after the first two weeks. Parthenogenesis is

common, but the offspring of unfertilized eggs are all males. De Toledo reported nine generations a year in Brazil.

Males of this wasp seem to be very uncommon in collections.

Distribution. — The native home of *Prorops nasuta* is Africa (Uganda, Tanganyika, and the Congo), but as noted above it has been introduced into Brazil and Java. Releases in Brazil were primarily in the São Paulo area; a series in the USNM is from Campinas, near São Paulo, taken in 1938.

Included species. — Only the type species:

nasuta Waterston, 1923, pp. 113-114; ♀, Uganda (♂ figured by Hempel, 1934, figs. 4, 5) (introduced into Brazil).

3. Genus CEPHALONOMIA Westwood

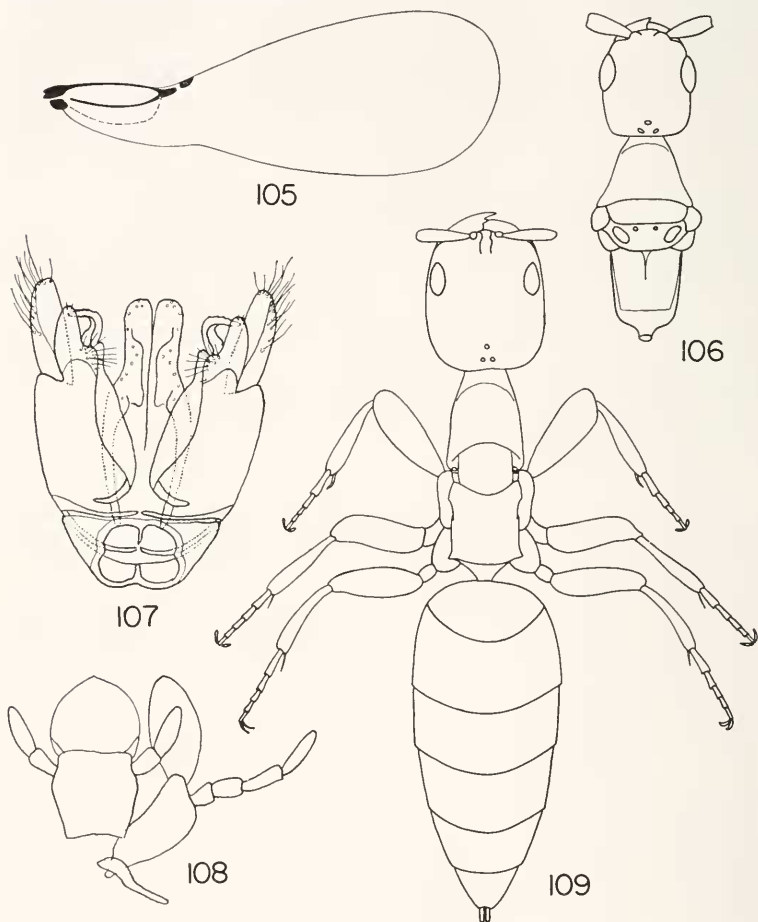
Cephalonomia Westwood, 1833, p. 420 (type species *C. formiciformis* Westwood, monobasic). — Ashmead, 1893, pp. 47-50 (U.S. spp., in part). — Ashmead, 1902, pp. 271, 272. — Kieffer, 1906a, pp. 449-461 (European spp.). — Kieffer, 1908a, pp. 39-40. — Kieffer, 1914, pp. 242-249 (spp. of world). — Berland, 1928, pp. 131-137 (French spp.). — Gahan, 1931, pp. 218-221. — Richards, 1939, pp. 299-305 (British spp.). — Kurian, 1955, pp. 76-77 (key to Oriental spp.).

Holopedina Foerster, 1850, p. 502 (type species *H. polypori* Foerster [= *formiciformis* Westwood], monobasic; synonymy by Ashmead, 1893).

Cephaloderma Hoffer, 1936, pp. 459-461 (proposed as subgenus, type species *Cephalonomia (Cephaloderma) strandi* Hoffer [= *gallicola* Ashmead], monobasic; new synonymy).

Generic characters. — Very small wasps (0.7-2.5 mm), of black to brown or pale, yellowish coloration; wings fully developed, very short, or absent (in either sex). Head longer than wide, its width usually exceeding maximum width of thorax; maxillary palpi with four or five segments; labial palpi with one or two segments; mandibles with a strong apical tooth and two or three additional, smaller teeth; clypeus very short, median lobe absent or poorly developed, weakly rounded, truncate, or slightly emarginate; basal margin of clypeus produced upward medially, reaching a point well above antennal sockets; eyes small, HE sometimes measuring no more than about .3 X WH, eyes with sparse, very short hairs or somewhat more conspicuously hairy; ocelli generally present, but tending to be weak or even absent in wingless forms; antennae simple, with twelve segments; occipital carina absent.

Pronotum simple, with smooth contours; mesoscutum without notauli, parapsidal furrows present as thin lines in winged forms; scutellum often not separated from scutum in wingless forms, otherwise scutellum with a transverse groove or paired pits at base; propodeal disc at least weakly margined on sides, often more or less margined posteriorly, occasionally with a median carina; mesopleura with a pit above in winged forms;



Cephalonomia spp. Fig. 105. *C. tarsalis* (Ashmead), fore wing, female. Fig. 106. Same species, head and thorax, female. Fig. 107. Same species, male genitalia. Fig. 108. Same species, labium and maxilla, female. Fig. 109. *C. gallicola* (Ashmead), female.

legs smooth and without spines or strong setae; claws simple or weakly dentate. Tegulae absent in some completely wingless forms, present when wings are short or of normal development; fully winged forms with subcosta leading to a strong prostigma, the latter separated slightly from the stigma; radial vein absent; median vein often absent, when present arching up to join prostigma; basal vein absent; hind wing with anal lobe very small; outer margin of fore wing and outer and hind margin of hind wing strongly fringed. Abdomen sessile, rather robust. Male subgenital plate simple, weakly rounded or truncate apically. Male genitalia with the parameres short and broad; cuspides in the form of broad, undivided plates; aedeagus elongate, bilobed apically; basal ring strong. Van Emden (1931, figs. 28-30) has figured the genitalia of *gallicola*, which do not differ notably from those of *tarsalis*, figured here. (Figs 105-109.)

Remarks.—Detailed studies of the morphology of *Cephalonomia* have been made by Grandi (1929) and by Van Emden (1931). There is considerable structural diversity in the genus, and future workers may find it desirable to recognize two or more subgenera. Richards (1939) recognized three types of species:

- (1) Both sexes macropterous (*tarsalis*, *waterstoni*, *utahensis*, *hyalinipennis*)
- (2) Males macropterous, females macropterous or brachypterous (*formiciformis*)
- (3) Males macropterous or apterous, females apterous; coloration pale (*gallicola*, *urichi*)

To this a fourth type can now be added:

- (4) Males macropterous or apterous, females macropterous, micropterous, or apterous (*perpusilla*)

Certain possibly important structural features appear to concord with this grouping of species; for example, the propodeum of *gallicola* is angularly produced on the sides behind, and the maxillary palpi of this species have five segments as compared to four in *tarsalis*. Kearns (1934b) has published on wing inheritance in *gallicola*. Although more has been published on the structure and behavior of *Cephalonomia* than of any other genus of bethylids, further studies will surely be rewarding. The subgeneric name *Cephaloderma* is available for *gallicola*, but I question the desirability of recognizing subgenera at this stage of our knowledge. Betrem (1961) has discussed the variation in palpal segmentation in this genus.

Biology.—So far as known, all species of *Cephalonomia* attack the larvae or pupae of small beetles occurring in cryptic situations. Much has been published on the biology of these wasps, and not all of it can be reviewed here. For convenience, the species can be grouped into three ethological types, but these three types are not completely in accord with the four types based on wing development:

- (1) Attack beetles infesting stored products (*tarsalis*, *waterstoni*, *gallicola*, *meridionalis*)
- (2) Attack ciid beetles occurring in fungus (*formiciformis*, *perpusilla*, *mycetophila*, *hammi*)
- (3) Attack bark beetles (*hyalinipennis*, *utahensis*, *hypobori*)

C. gallicola has been studied in some detail by Van Emden (1931) and by Kearns (1934a, b). The known hosts include the drugstore beetle, *Stegobium paniceum* (L.), the cigarette beetle, *Lasioderma serricornis* (Fabr.) (both Anobiidae), and spider beetles of the genus *Ptinus* (Ptinidae). The female wasps chew a hole into the wall of the cocoon of the host, sting it, and deposit from one to nine eggs on the full-grown larva, prepupa, or pupa in the cocoon; the wasp may remain within the cocoon for from a few hours to two days, and may feed on the host herself. Although one *Cephalonomia* larva is sufficient to kill the host, several of them commonly develop successfully on the same larva or pupa. Males and females may develop on the same host and spin their cocoons adjoining one another; the males emerge first and chew their way into the cocoons containing females and mate with them before they emerge. Females may reproduce parthenogenetically, producing male progeny. The life cycle from egg to adult requires only two to three weeks, and individual females may parasitize up to 76 hosts in a period of 36 days.

C. tarsalis is a parasite of the saw-toothed grain beetle, *Oryzaephilus surinamensis* (L.) (Cucujidae), the rice weevil, *Sitophilus oryzae* (L.) (Curculionidae), and probably other beetles occurring in stored grain. Either larvae or pupae are attacked, and after stinging they may be dragged about to a place of concealment. According to Powell (1938), the eggs are laid in pairs on the host, one to produce a male, the other a female; the male reaches the adult stage first and enters the cocoon of the female and copulates with her. Unfertilized females produce only male offspring. *C. waterstoni* also attacks beetle larvae occurring in stored grain, including *Laemophloeus ferrugineus* (Steph.) (Cucujidae); Finlayson (1950, 1952) has studied host preference

in this species. *C. meridionalis* is reported to attack *Oryzaephilus surinamensis* in Argentina.

Schaefer (1962) has recently published an account of the biology of *C. utahensis* as a parasite of the cone beetle *Conophthorus radiatae* Hopkins in California. The female wasps enter the galleries of these beetles and paralyze the second instar larvae or pupae. From one to six eggs are laid per host, but the mature larvae are smaller when four to six develop on a host than when fewer are present. Ruckes (1956) had previously reported *utahensis* from two other species of *Conophthorus* in California. *C. hyalinipennis* is recorded from bark beetles of the genera *Pityphthorus*, *Scolytus*, and *Hypothenemus*.

Little information is available on the species attacking Ciidae. Richards (1939) presented many records for *C. formiciformis* and one for *C. hammi* Richards being associated with fungus infested with Ciidae, and *C. perpusilla* attacks Ciidae occurring in fungi in western North America. Several species, including *hyalinipennis*, *gallicola*, and *cynipsiphila*, have been reared from galls, where they presumably developed on inquilinous beetles. *C. urichi* Brues is said to have been reared from a psocid, but I am inclined to question this record. Members of this genus are recorded as stinging man, especially in houses having heavy infestations of their hosts.

Distribution. — Cosmopolitan.

Included species. — This is apparently a relatively small genus, but those species which attack insects occurring in stored products are widely distributed as a result of commerce.

North America

cynipsiphila (Ashmead), 1887, p. 75; ♀, Florida.

gallicola (Ashmead), 1887, p. 75; ♀, Florida (widely distributed in North America, Europe, and Asia, probably cosmopolitan; ♂ also known) (synonyms: *nubilipennis* Ashmead, 1893, *xambeui* Giard, 1898, *quadridentata* Duchaussoy, 1917, *caesarorum* Van Emden, 1931, *strandii* Hoffer, 1936).

hyalinipennis Ashmead, 1893, p. 49; ♀, Florida.

perpusilla Evans, 1963c, p. 152; ♂, California (also Arizona, Nayarit Baja California; ♀ also described).

tarsalis (Ashmead), 1893, p. 45; ♀, Indiana (throughout U.S., also Europe, Australia, probably cosmopolitan; ♂ also known) (synonyms: *carinata* Kieffer, 1907, *kiefferi* Fouts, 1920).

utahensis Brues, 1909, p. 154; ♀, Utah (also California).
waterstoni Gahan, 1931, p. 219; ♀, Australia (widely distributed in North America, probably cosmopolitan).

South America

meridionalis Brèthes, 1913, p. 87; ♀, Argentina.

skottsbergi Brues, 1924, p. 315; ♂, Juan Fernandez Island.

urichi Brues, 1920, p. 151; ♂, Trinidad (♀ also described).

C. TRIBE SCLERODERMINI

Tribal characters.—Small wasps, rarely exceeding 5 mm, of slender build, wings fully developed or (fairly commonly) minute or absent. Maxillary palpi with five or six segments, labial palpi with two or three segments; mandibles relatively straight, slender or robust, with from two to seven apical teeth; antennae simple, with thirteen segments; clypeus with a short, broad median lobe which is truncate or emarginate apically; eyes of female rather small, not strongly convex, situated well forward and well toward front surface of head; occipital carina absent (except present in *Glenosema*). Pronotum elongate; mesoscutum with notauli absent or vaguely indicated; propodeum with or without a transverse carina margining the disc behind; tibiae with or without dense, short spines above; claws simple or dentate. Wings, when fully developed, somewhat variable; in *Nescopyris* the wings resemble the Epyrini, having three closed basal cells and a radial vein; in *Chilepyris* the radial vein has been lost (except for a very faint streak); and in *Scleroderma* the stigma is small and the costa (sometimes also the anal vein) absent; a prostigma is not present, although in *Nescopyris* the subcosta is somewhat thickened beyond the junction of the basal vein. Abdomen relatively elongate. Males are known only in the genus *Scleroderma*; in this genus the genitalia are of unusual form, the parameres being completely divided into dorsal and ventral lobes; the digiti are broad, setose; the basal ring is small.

Distribution.—Cosmopolitan.

Included genera.—Five genera occur in this hemisphere. I presume that *Atelcopteris* Foerster (Europe) and *Discleroderma* Kieffer (Burma) belong to this tribe, but I have seen no representatives of these genera.

KEY TO GENERA OF SCLERODERMINI

1. Wings fully developed, fore wing with costa and subcosta present and enclosing a slender costal cell, radial vein present or at least indicated by a very faint line (Figs. 110, 113); propodeum with a median carina (not always complete) 2
- Wings often reduced or absent, when fully developed without a costa or costal cell and without a radial vein or any indication thereof (Fig. 118); propodeum without a median carina 3
2. Radial vein strong, stigma small (Fig. 110); head elongate, much longer than wide, only slightly if at all wider than maximum width of thorax (Fig. 111) 1. NESEPYRIS Bridwell, p. 161
- Radial vein absent except indicated by a very faint line, stigma very large, almost circular (Fig. 113); head very large, wider than long, much wider than maximum width of thorax (Fig. 114) 2. CHILEPYRIS new genus, p. 166
3. Propodeal disc margined behind by a transverse carina (Fig. 115); occipital carina present; mandibles with seven apical teeth and the entire upper margin minutely denticulate; scutellum with a strong transverse groove at base 3. GLENOSEMA Kieffer, p. 168
- Propodeal disc not margined behind (Figs. 117, 120); occipital carina absent; mandibles with fewer teeth and not denticulate on upper margin 4
4. Abdominal sternites 4-6 deeply biemarginate, with broad median apical plates and more narrow lateral plates (Fig. 117b); abdominal venter with scales; tegulae and wings present but minute (Fig. 117a) (males unknown) 4. LEPIDOSTERNOPSIS Ogloblin, p. 170
- Abdominal sternites simple or their margins shallowly sinuate, without scales; either without tegulae and wings, or tegulae and wings fully developed (Figs. 118-121) 5. SCLERODERMA Latreille, p. 173

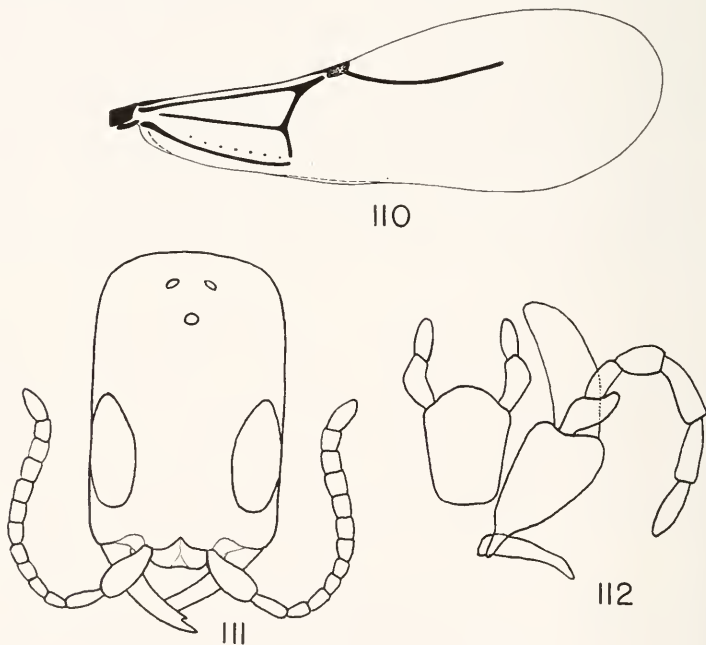
1. Genus NESEPYRIS Bridwell

Nesepyris Bridwell, 1920, pp. 309-311 (type species *N. ewa* Bridwell, monobasic).

Generic characters (of female; male unknown). — Very small wasps (about 2-3 mm), of dark coloration, known species fully winged. Head much longer than wide, its sides nearly parallel, the eyes situated toward the front, far removed from posterior margin; maxillary palpi with six segments, labial palpi very short, with only two segments; mandibles unusually long and slender, crossed in repose, terminating in two or three teeth; clypeus with a short median lobe which is truncate or emarginate apically; antennae inserted close to and overhanging base of clypeus, simple, with 13 segments; eyes covered sparsely with short hairs, eyes separated from posterior margin of head by

much more than their own height; ocelli in an acute triangle far above eye tops; occipital carina absent.

Pronotum elongate, disc on a somewhat higher plane than collar; mesoseutum short, transverse, parapsidal furrows present, notauli strong or vaguely impressed and incomplete; scutellum with a pair of basal pits which are connected by a groove or a very shallow impression; propodeal disc margined laterally and behind, median carina present, not or barely reaching transverse carina, not extending down the declivity, posterolateral angles of disc not areolate; mesopleura with an oblique depression in the center; femora moderately swollen and flattened; middle tibiae covered with minute spines on upper surface; claws simple or weakly dentate. Fore wing with three closed basal cells and a well-developed, long radius, as in the Epyrini; basal vein reaching subcosta basad of stigma by about two-thirds its own length, subcosta thickened beyond junction with basal vein, almost to the extent of forming a prostigma; stigma very short,



Nescopyris spp. Fig. 110. *N. virginianus* n. sp., fore wing, female. Fig. 111. *N. floridanus* n. sp., anterior aspect of head, female. Fig. 112. *N. floridanus* n. sp., labium and maxilla, female.

hardly longer than wide; margins of wings fringed with setae much as in *Cephalonomia* and *Scleroderma*. Abdomen relatively short and broad, slightly depressed. (Figs. 110-112.)

Remarks.—This genus is of unusual interest because of its resemblances, on the one hand, to *Holepyris* (mesoscutum, propodeum, wing venation) and, on the other, to *Scleroderma* (clypeus, head shape, eyes). The fact that this genus shares some of the characters of the Epyrini and Sclerodermini leads me to feel that it is unwise to place *Scleroderma* and its allies in a separate subfamily, as is commonly done.

Biology.—Bridwell states that “experiments made with the paratype female [of *ewa*] indicate that the species is predaceous upon small lepidopterous larvae, probably those feeding about dead wood.” Two specimens of the North American species *virginianus*, described below, are labeled as having been bred from redbud (*Cercis canadensis*), while another was taken “under hickory bark.” It is probable that these wasps, like those of the genus *Scleroderma*, occur chiefly around wood and stems and attack borers.

Distribution.—North and South America and Hawaii. It is probable that the type species, *ewa*, was introduced into Hawaii from tropical America. Bridwell remarks that the types were taken on Oahu near sea level, and I have studied a specimen from Santa Catarina, Brazil, closely resembling the type.

Included species:

ewa Bridwell, 1920, p. 310; ♀, Oahu, Hawaii (also Santa Catarina, Brazil).

floridanus Evans, n. sp. described below from ♀, Florida (also Mexico).

virginianus Evans, n. sp. described below from ♀, Virginia (also Maryland).

KEY TO SPECIES OF *NESEPYRIS* (FEMALES)

1. Mandibles with three teeth; scutellar pits connected by a transverse arching groove; notauli strong; antennae testaceous (Hawaii, Brazil) *ewa* Bridwell
- Mandibles with two teeth; scutellar pits separated, connected only by a very shallow impression; notauli very weak and incomplete; antennae brown (North America) 2
2. Head about 1.33 X as long as wide; WF slightly exceeding HE; transverse median vein of fore wing slightly oblique; clypeus truncate apically (Virginia, Maryland) *virginianus* n. sp.

Head distinctly more slender, about 1.5 X as long as wide; WF slightly less than HE; transverse median vein straight, erect; clypeus emarginate apically (Florida, Mexico) *floridanus* n. sp.

NESEPYRIS VIRGINIANUS new species

Holotype. — ♀, VIRGINIA: Rosslyn (no further data) [USNM, No. 65,000].

Description of female type. — Length 2.2 mm; LII .52 mm; LFW 1.4 mm. Entire body dark castaneous; first two antennal segments light brown, remainder medium brown; legs medium brown except tarsi light brown; wings hyaline, stigma brown, veins very light brown. Mandibles with two strong apical teeth. Clypeus truncate apically. Head .75 X as wide as high (1.33 X as high as wide), almost rectangular, the vertex nearly straight; eyes fairly large, rather close together, WF .52 X WH, 1.03 X HE; eyes removed from posterior margin of head by about 1.3 X HE. OOL subequal to HE, 2.2 X WOT. First four antennal segments in a ratio of about 4:2:1:1, segment three barely longer than wide, segment eleven wider than long. Head, in lateral view, somewhat convex on upper side but flat below; temples wider than eyes. Front somewhat shining but quite noticeably alutaceous; punctures minute but rather close together, giving rise to short, pale setae.

Pronotal disc with a weak transverse carina on the anterior end, sides gradually expanded from front to rear, surface alutaceous, obscurely punctate. Mesoscutum with notauli faintly indicated anteriorly; scutellum with basal pits small, widely separated, connected by only a very shallow impression. Propodeal disc 1.05 X as wide as long, median carina obsolete on apical .4, basal third with numerous weak carinae, remainder of disc polished, with very weak sculpturing. Fore wing as shown in Figure 110. Claws weakly dentate.

Paratypes. — MARYLAND: 1 ♀, Bethesda, 18 Aug. 1940, under hickory bark (J. C. Crawford) [USNM]. Also 2 ♀♀ without locality data but probably taken near Washington, D.C., labeled as bred from redbud, *Cercis canadensis* (Chittenden) [USNM].

Variation. — The Bethesda specimen has the body nearly black and is slightly larger than the type (about 2.5 mm; LH .67 mm; LFW about 1.7 mm); in this specimen WH is .77 X LH, WF .51 X WH, 1.08 X HE. The specimens from redbud resemble the type in color; one is lacking the head and is otherwise in poor condition, while the other measures slightly larger

than the type (LH .61 mm; LFW 1.6 mm). In this second specimen WH is .76 X LH, WF .51 X WH, 1.03 X HE. In all other respects the paratypes closely resemble the type.

NESEPYRIS FLORIDANUS new species

Holotype. — ♀, FLORIDA: Pasco Co., 27 Feb. 1930 (O. C. Tigner, Fla. fruit fly trap survey) [USNM, No. 64,999].

Description of type female. — Length about 1.9 mm; LH .55 mm; LFW 1.3 mm. Body dark brownish-fuscous; mandibles and basal segments of antennae medium brown, apical half of antennae dark brown; legs brown except tarsi and apical parts of tibiae light yellowish brown; wings hyaline, veins and stigma very light brown. Mandibles with two apical teeth, as in the preceding species. Clypeus with a shallow, V-shaped median emargination. Head .65 X as wide as high (1.54 X as high as wide), parallel-sided, vertex straight; eyes close together, WF only .47 X WH, .82 X HE; eyes removed from posterior margin of head by about 1.2 X HE. OOL subequal to HE, 2.5 X WOT. Antennae as described for *virginianus*. Front rather strongly alutaceous, moderately shining, punctures very small, closely spaced.

Characters of thoracic dorsum as in *virginianus*, but the scutellar pits slightly closer together. Propodeal disc approximately as wide as long, median carina complete although very weak on posterior third, disc strongly alutaceous and weakly longitudinally striate on anterior half. Fore wing as figured for *virginianus*, but the transverse median vein straight up and down, forming nearly a straight line with the basal vein.

Paratypes. — FLORIDA: 1 ♀, Orange Co., 3 July 1929 (M. M. Smith, Jr., Fla. fruit fly trap survey) [USNM]. MEXICO: 1 ♀, "On pineapple" 14 June 1938 (presumably intercepted at quarantine) [USNM].

Variation. — The Orange Co. specimen is the same size as the type and agrees with it in every detail, including measurements, except that the median carina of the propodeum is distinct on the anterior .8 of the disc, obsolete behind. The Mexican specimen is slightly larger than the type (LH .62 mm, LFW 1.4 mm); in this specimen the head is .66 X as wide as high, WF .47 X WH, .92 X HE, OOL 2.3 X WOT. The Mexican specimen also differs in having the scutellar pits somewhat more elongate, the propodeal disc only .95 X as wide as long, and the median carina of the propodeum obsolete on the posterior .3 of the disc. In all other respects it is very similar to the type.

2. Genus CHILEPYRIS new genus

Type species.—*Chilepyris herbsti*, new species.

Generic characters (of female; male unknown).—Known species about 4 mm long, of wholly dark coloration, fully winged. Head extremely large, much wider than thorax at its maximum, slightly wider than abdomen at its maximum; palpi slender, maxillary palpi with six segments, labial with three; mandibles robust, terminating in three large teeth; clypeus very short and broad, its apical margin slightly concave, with a transverse, U-shaped elevation which extends upward between the antennal sockets; antennae 13-segmented, arising slightly below level of bottoms of eyes; scape elongate, compressed, slightly curved; flagellum slender, filiform, only about 2.5 X as long as scape; eyes with sparse, short setae, relatively small, separated from top of vertex by nearly their own length; malar space absent; temples wide; occipital carina absent.

Pronotum much longer than mesoscutum, with smooth contours except for a transverse groove separating collar from anterior slope; notauli completely absent, but parapsidal grooves strong; scutellum with a long, slender transverse groove at base; propodeum very short, disc margined laterally and posteriorly and with a complete median carina which continues weakly down the steep declivity; posterolateral angles of disc not foveolate; mesopleura with a small pit, without other strong sculpturing; femora somewhat flattened and expanded, tibiae without spines although middle tibiae with rather dense, short setae; claws simple except with a sub-basal expansion. Fore wing with three closed basal cells (including the costal cell), stigma very large, rounded below and above, upper margin actually protruding slightly from outline of wing; radial vein absent, although a very faint streak can be made out in the position of this vein; basal vein short, reaching subcosta basad of stigma by nearly its own length. Abdomen stout, sessile, slightly depressed. (Figs. 113, 114.)

Remarks.—This genus is known from a single specimen. It is difficult to be certain of its proper position, but the features of the head suggest *Scleroderma*.

Biology.—Unknown.

Distribution.—Chile.

Included species.—Only the type species, described below.

CHILEPYRIS HERBSTI new species

Holotype. — ♀, CHILE: Baños de Cauquenes, Prov. Maule, Oct. 1907 (P. Herbst) [MCZ, No. 30,809].

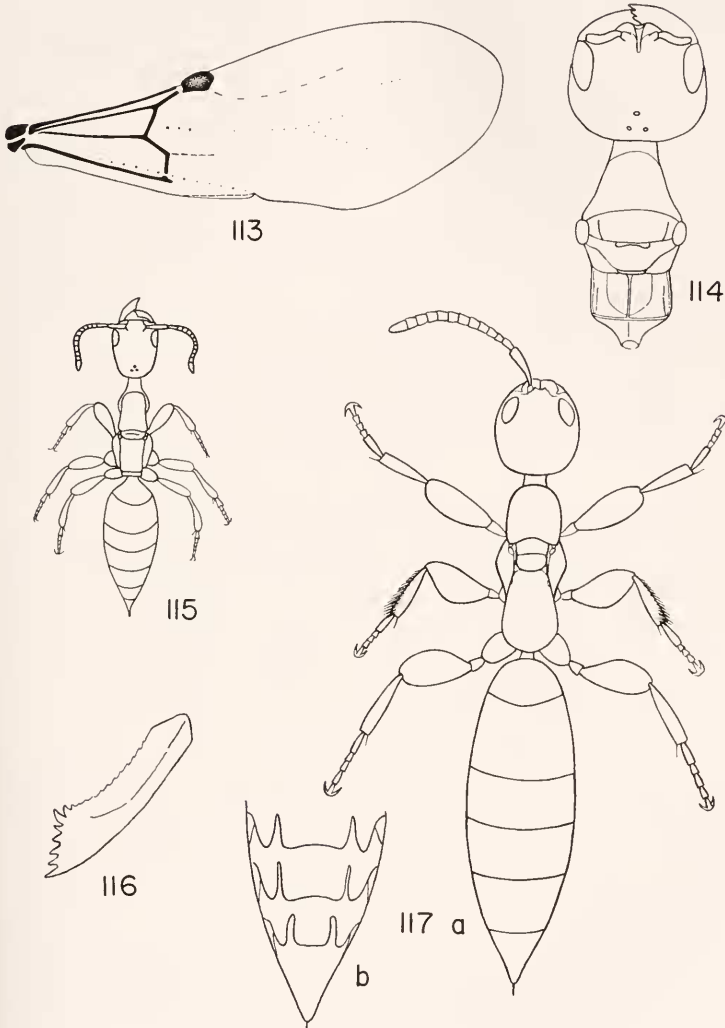


Fig. 113. *Chilepyris herbsti* n. sp., holotype female, fore wing. Fig. 114. Same specimen, head and thorax. Fig. 115. *Glenosema crandalli* n. sp., holotype female. Fig. 116. Same specimen, mandible. Fig. 117a. *Lepidosternopsis niveifemur* n. sp., holotype female. Fig. 117b. Same specimen, apical half of abdomen in ventral view.

Description of type female. — Length 4 mm; LFW 2.4 mm. Body piceous; mandibles, antennae, tegulae, and legs wholly dark brown; fore wing very lightly tinged with brownish, veins and stigma brown. Head 1.06 X as wide as high, the head actually slightly wider behind the eyes than through them. First four antennal segments in a ratio of about 13:4:3:3, segment three about twice as long as thick, segment eleven about 1.3 X as long as thick. WF .67 X WH, 1.70 X HE; ocelli in a compact triangle, front angle less than a right angle, OOL 2.4 X WOT. Front moderately shining, uniformly alutaceous, with small, widely spaced punctures.

Thoracic dorsum shining, weakly alutaceous, obscurely punctate; mesoscutum, between the parapsidal furrows, twice as wide as long; scutellar disc broad, not very convex. Propodeal disc 1.9 X as wide as long, median and basal parts of disc with irregular sculpturing, sublateral carina developed, disc otherwise somewhat shining, with only weak surface sculpturing. Front femora nearly 3 X as long as wide, hind femora about 2.1 X as long as wide. Wings as shown in Figure 113.

3. Genus GLENOSEMA Kieffer

Glenosema Kieffer, 1905a, p. 100 (no species). —Kieffer, 1905b, p. 253 (no species). —Kieffer, 1906a, pp. 431-432 (type species *G. nigra* Kieffer [= *merceti* Kieffer], monobasic). —Kieffer, 1908a, p. 43. —Kieffer, 1914, p. 250. —Berland, 1928, pp. 130-131.

Arysepyris Kieffer, 1905a, p. 102 (type species *A. merceti* Kieffer, monobasic; synonymy with *Glenosema* by Berland, 1928). —Kieffer, 1905b, p. 256. —Kieffer, 1906a, pp. 337-340. —Kieffer, 1908a, p. 30. —Kieffer, 1914, pp. 406-408.

Generic characters (of female; male unknown). — Length 2-5 mm; color predominantly black; wings minute, barely if at all longer than the tegulae. Head considerably wider than maximum width of thorax, gradually narrowed behind, the vertex rounded; palpi not noticeably reduced; mandibles relatively straight, their apices with seven minute but sharp denticles, the innermost ones directed upward; entire upper margin of mandibles with very small, sharp denticles; clypeus very short, extending beyond antennal sockets by little if any more than the diameter of the latter, medially broadly truncate or shallowly emarginate; upper margin of clypeus rather ill-defined, forming a median angulation which extends well above antennal sockets; antennal sockets widely separated, directed downward and laterad; antenna 13-segmented, scape elongate, slightly curved, second segment about

as long as third and fourth together; flagellum slender, apical segments with rather large sensoria; eyes fairly large, but not protruding from sides of head and separated from vertex by more than their own height, covered sparsely with short setae; ocelli present although small; occipital carina complete.

Pronotum more than twice as long as mesonotum, disc on a much higher plane than collar, anterior face and sides rounded; mesoscutum shorter than scutellum, without notauli or parapsidal furrows; scutellum short, with a strong transverse groove at base, posterior margin convex, in broad contact with the propodeum; propodeal disc quadrangular, longer than wide, margined laterally and posteriorly but otherwise smooth, without carinae, striae, or reticulations; declivity of propodeum nearly vertical; mesopleura without strong sculpturing, rather strong, protruding from sides of thorax in dorsal view; femora not much swollen, tibiae not spinose; claws dentate. Tegulae of nearly normal size, but fore wings extremely short, slightly if at all longer than tegulae, with one or two simple veins evident; hind wings absent. Abdomen sessile, tapering and weakly depressed apically. (Figs. 115, 116.)

Remarks. — The above diagnosis is based on the Palaearctic species *pedestris* Kieffer and *levis* Kieffer, as well as on the single known Nearctic species. Kieffer is incorrect in stating that the ocelli are lacking in the type species, *merceti* (see Berland, 1928). It is unlikely that *bifoveatus* Kieffer, from Spain, is correctly assigned to this genus.

Muesebeck and Walkley (1951, p. 727) reported *Glenosema* from North America, but their record was based on *Arysepyris californicus* Bridwell, a species which I have transferred to the genus *Bethylus* as a synonym of *B. decipiens* (Provancher) (Evans, 1962a). The genus does occur in North America, however, the single known species being rather similar to the North African species *pedestris* Kieffer.

Biology. — Unknown.

Distribution. — Southern parts of the Palaearctic and Nearctic regions.

Included species. — The type species, *merceti*, occurs in France and Spain, the other two Palaearctic species, *pedestris* and *levis*, in North Africa. Our single species occurs in southern Arizona and is known from a single specimen.

GLENOSEMA CRANDALLI new species

Holotype. — ♀, ARIZONA: Santa Catalina Mts., "5-3" 1938 (R. H. Crandall) [MCZ, No. 30,810].

Description of type female — Length about 3 mm. Head and thorax black except pronotal collar light ferruginous; center of first abdominal tergite black, abdomen otherwise dark reddish brown except fading to yellowish brown apically; palpi straw-colored; mandibles testaceous; basal half of antennae testaceous except segments suffused with brown on upper side, remainder of antennae medium brown; legs testaceous except front coxae and all femora suffused with medium brown; tegulae testaceous, wings straw-colored. Mandibles as described under generic heading and as shown in Figure 116. Clypeus arcuately concave apically, with a small median elevation which is dentate in profile. Head widest across eyes, only a short distance back from base of mandibles, greatest width of head .92 X LH. WF .65 X WH, 1.57 X HE; eyes about 1.3 X as high as wide, removed from vertex crest by more than HE. Ocelli small, front angle of ocellar triangle only about 45°; OOL about 5 X WOT; ocellar triangle far above eye tops. Front polished, very weakly alutaceous, with small but sharply defined punctures which are separated by 3-5 X their own diameters; temples and under side of head also polished and very weakly alutaceous, but vertex, behind ocellar triangle, rather strongly alutaceous. First four antennal segments in a ratio of about 23:12:6:7, segment two nearly 3 X as long as wide, segments three and eleven each about 1.4 X as long as wide.

Dorsum of thorax and propodeum wholly alutaceous, more so on the mesonotum than elsewhere, pronotum and propodeal disc rather shining. Scutellum 2.6 X as wide as long, its base with an arching groove. Propodeal disc .83 X as wide as long, almost parallel-sided. Wings not quite as long as tegulae, broad and subtruncate apically.

4. Genus LEPIDOSTERNOPSIS Ogloblin

Lepidosternopsis Ogloblin, 1953, pp. 101-106, figs. 1-6 (type species *L. kuscheliana* Ogloblin, monobasie).

Generic characters (of female; male unknown). — Length 3-5 mm; color predominantly brownish or fuscous; wings present but extremely small. Head longer than wide, about 1.3 X as

wide as maximum width of thorax; head widest about or somewhat behind the middle, sides converging anteriorly and posteriorly, vertex evenly rounded; maxillary palpi with five segments, labial palpi with three segments, although very short; mandibles robust, terminating in three sharp teeth; clypeus with a very broad, truncate median lobe which is strongly carinate medially; antennae arising well below level of bottoms of eyes, their sockets close together, one on each side of base of median carina of clypeus; antennae simple, of thirteen segments, scape long and slightly curved, flagellum 2-3 X as long as scape; eyes with a few very short hairs, not very convex, located well toward front surface of head, malar space fairly long, temples very strong; distance from tops of eyes to vertex crest much greater than HE; ocelli absent; occipital carina absent.

Pronotum sloping upward gently from collar, with smooth contours, much longer than mesonotum; mesoscutum very short, without notauli or parapsidal furrows; scutellum separated from mesoscutum by a transverse pigmented streak (in the type species, according to Ogloblin, the mesonotum is undivided); scutellum without a transverse groove or pits; posterior margin of scutellum rounded, in broad contact with the propodeum; propodeum gradually expanded from front to rear, the disc without a transverse margining carina behind; mesopleurum rather convex, with a small dorsal surface; femora considerably swollen, somewhat flattened; middle tibiae densely covered with small spines on upper surface; claws dentate. Tegulae very small; fore wings very small, barely if at all longer than tegulae; hind wings absent. Abdomen sessile, slightly depressed apically; sternites 4-6 strongly biemarginate, the emarginations deep, cutting off a broad truncate median lobe, and a pair of much narrower lobes which are rounded apically; several of the sternites bear transverse rows of large scales (see figs. 5 and 6 in Ogloblin, 1953). (Fig. 117.)

Remarks.— This remarkable genus was described from the islands of Juan Fernandez. Ogloblin has provided a detailed, well illustrated description of the type species. The genus is perhaps less sharply separated from *Scleroderma* than Ogloblin thought. Some species of *Scleroderma* (e.g. *carolinense*) have dense, short spines on the middle tibiae as well as the “tres pequeñas celdillas marginales” on tergites 3-5 described by Ogloblin for the type species. These same species of *Scleroderma* also have the posterior margins of sternites 4-6 strongly sinuate,

although by no means as strongly modified as in *Lepidosternopsis*.

Biology. — According to Ogloblin (1953), the type species of this genus is an external parasite of the larvae of *Strongylopterus ovatus* Boh. (Curculionidae).

Distribution. — Islands of Juan Fernandez and continent of Australia; not known to occur on continental North or South America. The genus has not previously been recorded from Australia, but its occurrence on that continent seems of sufficient interest to justify describing two specimens in the MCZ collection which clearly belong here, each representing a distinct species. The three known species of the genus may be separated by the following key.

KEY TO SPECIES OF *LEPIDOSTERNOPSIS* (FEMALES)

1. Length about 4.8 mm; mesonotum undivided; body dark castaneous, legs, base of antennae, and median parts of pronotum and propodeum testaceous (Juan Fernandez) *Kuscheliana* Ogloblin
 Length about 3 mm; mesoscutum separated from scutellum by a linear streak; color not exactly as above 2
2. Head and thorax dark castaneous, legs brownish except hind femora contrastingly white; head considerably longer than wide, WH .85 X LH (New South Wales) *niveifemur* n. sp.
 Head light rufo-castaneous, thorax testaceous, legs testaceous except middle and hind coxae and hind femora straw-colored; head slightly longer than wide, WH .91 X LH (Western Australia)
 *darlingtoni* n. sp.

LEPIDOSTERNOPSIS NIVEIFEMUR new species

Holotype. — ♀, AUSTRALIA: NEW SOUTH WALES: The Dorrigo, 3,000 ft. (G. Heron) [MCZ, No. 30,811].

Description of type female. — Length about 3 mm. Head, prothorax, and mesopleura medium castaneous, mesonotum light castaneous, propodeum dark castaneous; abdomen piceous, except somewhat paler apically; mandibles testaceous, the teeth rufous; antennae testaceous except scape weakly suffused with brownish; clypeus and extreme lower front light brown; tegulae testaceous; front and middle legs medium brown, except tarsi light yellowish brown; hind legs of the same color, except femora contrastingly pure white. Median elevation of clypeus strong, angulate in profile, triangularly flattened as seen from below. First four antennal segments in a ratio of about 19:6:3:2, segments 3-12 all wider than long. WH .85 X LH; WF .51 X WH,

1.4 X HE; eye about 1.3 X as long as wide; malar space about one-third as long as eye. Head shining, weakly alutaceous, with weak, widely spaced punctures.

Pronotal disc nearly 1.5 X as long as mesonotum, shining, weakly alutaceous, with scattered punctures. Mesonotum 1.5 X as wide as long, mesoscutum and scutellum separated by a transverse line. Propodeum shining, very weakly alutaceous. Front and hind femora each about twice as long as their maximum width; middle tibiae with very numerous spines above. Margins of sternites 4-6 as described under generic heading, and almost exactly as figured by Ogloblin for *kuscheliana*; arrangement of scales on sternites difficult to work out in detail in the one available specimen.

LEPIDOSTERNOPSIS DARLINGTONI new species

Holotype. — ♀, AUSTRALIA: WESTERN AUST.: Geraldton, Oct. 1931 (Harvard Univ. Exped., P. J. Darlington, Jr.) [MCZ, No. 30,812].

Description of type female. — Length about 3 mm. Head light rufo-castaneous, suffused with brownish beneath; thorax and propodeum testaceous; abdomen dark castaneous dorsally, much paler, almost testaceous ventrally; antennae testaceous; legs testaceous except middle and hind coxae and hind femora straw-colored. Clypeus as in *niveifemur*. First four antennal segments in a ratio of about 8:2:1:1, segments 3-12 all wider than long. WH .91 X LH; WF .53 X WH, 1.65 X HE; eyes very small, removed from posterior margin of head by about 1.8 X HE; malar space about .4 X HE. Head shining, weakly alutaceous, punctures small, separated by 2-3 X their own diameters.

Pronotal disc about 1.5 X as long as mesonotum, weakly alutaceous, punctures widely separated. Mesonotum about 1.4 X as wide as long, scutum and scutellum separated by a linear groove which is darkly pigmented. Propodeum rather strongly alutaceous, moderately shining. Wings about as long as tegulae, abruptly truncate behind. Structures of legs as in *niveifemur*. Sternites 4-6 modified as in *kuscheliana* and *niveifemur*; sternites 2-4 with numerous large scales in transverse series.

5. Genus SCLERODERMA Latreille

Sclerodermus Latreille, 1809, p. 118 (type species *S. domesticus* Latreille, monobasic). —Kieffer, 1914, pp. 253-269 (spp. of world). —Bridwell, 1919, pp. 25-33 (biology, Hawaiian spp.). —Bridwell, 1920, pp. 291-314 (biology, Hawaiian spp.).

Scleroderma Oken, 1817, p. 1178 (emendation). —Westwood, 1839, pp. 164-172 (revision). —Saunders, 1881, pp. 109-116. —Westwood, 1881, pp. 117-125. —Ashmead, 1893, pp. 40-41. —Ashmead, 1902, p. 270. —Kieffer, 1905b, p. 256. —Kieffer, 1906a, pp. 432-449 (European spp.). —Kieffer, 1908a, pp. 41-42. —Berland, 1928, pp. 124-129 (French spp.). —Wheeler, 1928, pp. 62-64 (biology). —Bernard and Jacquemin, 1948, pp. 160-167 (North African spp.). —Kurian, 1955, pp. 77-78 (key to Oriental spp.).

Sclerochroa Foerster, 1850, p. 501 (proposed as new name for *Scleroderma*, preoccupied in the plant kingdom; type species *S. domesticus*, automatically).

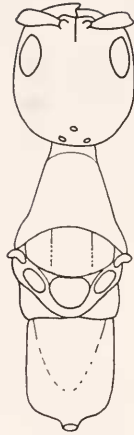
Neoscleroderma Kieffer, 1905a, p. 106 (type species *Ateleopterus virginiensis* Ashmead [= *carolinense* Ashmead], designated by Kieffer, 1914; new synonymy). —Kieffer, 1908a, p. 40. —Kieffer, 1914, pp. 269-271.

Generic characters. —Small wasps (1.5-6 mm) of light or dark coloration; wings present or absent (in either sex). Head longer than wide, its width slightly to considerably exceeding maximum width of thorax; maxillary palpi with five segments, labial palpi with three; mandibles with two sharp apical teeth, usually with from one to three small additional teeth basad of these; clypeus with a short median lobe which is truncate or emarginate apically; antennae inserted at base of clypeus, below level of bottoms of eyes; antennae simple, 13-segmented, the scape quite long; eyes glabrous or with sparse, short setae, rather small in apterous forms although their height measuring at least .25 X width of head; ocelli absent in apterous forms, normally developed in alate forms; occipital carina absent.

Pronotum with smooth contours, sloping but weakly from disc to collar; parapsidal furrows sometimes weakly indicated in alate forms, and these forms with the scutellum separated from the mesoscutum and with a narrow transverse groove basally, sometimes widened on each side; apterous forms with the mesoscutum and scutellum forming a single, smooth plate, the posterior margin of which is arcuate, in broad contact with the propodeum; propodeum parallel-sided or somewhat broadened posteriorly, disc without longitudinal or transverse carinae; mesopleura prominent, forming the widest part of the thorax although without a distinct dorsal surface; femora somewhat swollen; middle tibiae bare or densely covered on upper side with short spines; claws dentate. Apterous forms with wings and tegulae normally completely absent; alate forms with the wings rather slender, anterior and outer margins of fore wing and outer and posterior margins of hind wings strongly fringed, fore wing slightly indented near base of stigma; fore wing with costa



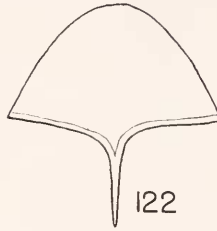
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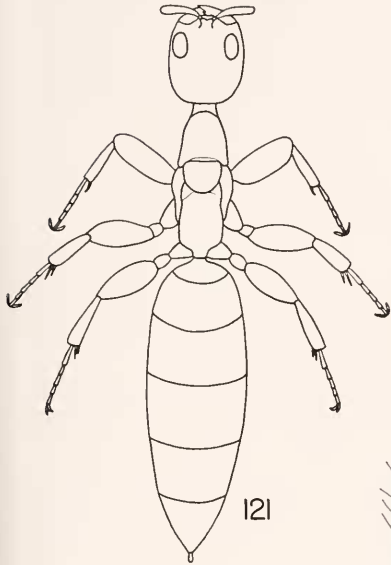
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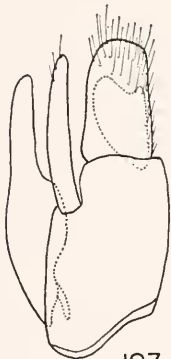
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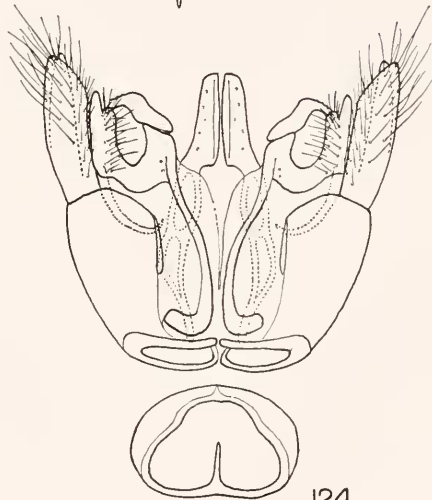
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Scleroderma macrogaster (Ashmead). Fig. 118. Fore wing of alate female. Fig. 119. Hind tarsal claw of alate female. Fig. 120. Head and thorax of alate female. Fig. 121. Apterous female. Fig. 122. Male subgenital plate. Fig. 123. Male genitalia, lateral aspect, dorsal surface (aedeagus) at left. Fig. 124. Male genitalia, ventral aspect with basal ring detached from genital capsule.

absent, subcosta, median, and basal veins present, anal and transverse median veins present or absent; basal vein meeting subcosta basad of stigma by about its own length, subcosta thickened between basal vein and stigma, but not forming a distinct prostigma; stigma minute, not giving rise to a radial vein; hind wing with anal lobe slender. Abdomen sessile, rather broad at base, relatively very long, especially in females; venter of female without scales, apical margins of some of sternites sinuate, but not deeply biemarginate as in *Lepidosternopsis*. Subgenital plate of male simple, with a long median basal stalk. Genitalia with the basal ring small; parameres divided into two completely separate lobes, much as in *Pseudisobrachium*; digiti broad, partially divided into ventral and dorsal arms, the ventral portion setose; aedeagus simple, elongate. (Figs. 118-124.)

Remarks.—Some authors have objected to the emendation of the name of this genus to *Scleoderma*. However, this spelling is etymologically more correct, and emendations of this type are within the spirit of the International Code. Furthermore, this spelling has been used much more commonly than *Scleodermus*. The name *Scleochroa* is properly considered a synonym of *Scleoderma*, as indicated above. Kieffer included only Foerster's *rufa* in *Scleochroa*, and this species is now regarded as a synonym of *Pristocera depressa*, type of the genus *Pristocera*. However, Foerster's *Scleochroa* was proposed as a new (although unnecessary) name, so it has the same type species as *Scleoderma*.

The majority (perhaps all) of the species of this genus are dimorphic in both sexes, being either fully winged, with ocelli well developed and mesonotum divided into scutum and scutellum, or completely apterous, without ocelli and with the mesonotum a single sclerite. Alate females are generally much less common than apterous females, but in the male sex the alate form is the more common. Males are generally much less common than females, and apterous males are very rare indeed. Bridwell (1920) found that in *S. immigrans* about one-third of the females are alate, while less than one per cent of the males are wingless. Bridwell states that in this species the ratio of females to males is about 5 to 1 but Keeler (1929a, b) found it to be generally about 12 to 1. The males are short-lived and hence are almost never collected except by rearing them from their hosts.

Biology. — Wheeler, in his book "The Social Insects" (1928), discussed the biology of these insects at some length, basing his discussion on his own studies of the North American species *macrogaster* as well as Bridwell's (1920) very similar observations on the Hawaiian species *immigrans*. Both of these species attack wood-boring beetle larvae, chiefly Cerambycidae, but they can be reared on a wide variety of beetle larvae; Bridwell also reared *immigrans* on various hymenopterous larvae and even on termites. The *Scleroderma* females, either singly or several together, subdue the much larger host by stinging it repeatedly, sometimes over a period of several days. The female then feeds on the blood of the host and eventually lays numerous eggs, chiefly at the intersegmental constrictions. The mother remains with the eggs and larvae, sometimes licking them, and may even remain on the host until her offspring emerge as adults. According to Wheeler, the mother "may mate with one of her sons and will readily paralyze another beetle larva, rear another brood and mate again with one of her grandsons." The female obtains all her nourishment from the host, and will not take water or carbohydrates. The males are said to die shortly after mating.

Keeler (1929a, b) found that virgin females of *S. immigrans* generally produced females. Bridwell (1929) questioned Keeler's techniques and felt that Keeler's females probably had mated. Thelytoky is apparently rare in the Bethylidae, but it has been reported in the genus *Parasierola* in the Bethylinae.

The host of the North American *macrogaster* is recorded as *Megacyllene antennatus* (Cerambycidae) by Muesebeck and Walkley (1951), and I have seen specimens of *carolinense* reared from *Dicerca lepida* (Buprestidae) and *Urographis fasciata* (Cerambycidae). The European species *domestica* is said to attack cerambycid larvae, while *fonscolombeii* attacks Scolytidae (Yamada, 1955). The Japanese species *nipponica*, the Hawaiian *muri*, and the Indian species *mori* are reported to attack Anobiidae, while other Indian species attack Bostrichidae and Lyctidae (Yamada, 1955; Kurian, 1955). Various unidentified species in the British Museum bear labels indicating an association with beetles of the families Anobiidae, Bostrichidae, and Cerambycidae. Thus it appears that the larvae of wood-boring Coleoptera provide the major hosts of these wasps. However, several Hawaiian species are reported by Bridwell (1920) to attack the larvae of wood-boring Lepidoptera such as *Hyposmocomma* and *Semnoprepia* (Tineoidea).

The types of all of the known South American species of *Scleroderma* were taken in association with ants, *iridomyrmicicola* Bruch with *Iridomyrmex humilis*, *formicarius* Kieffer with *Solenopsis saevissima*, and *galapagense* Brues with *Prenolepis fulva*. Although Bridwell reared *immigrans* successfully on ant larvae, it remains to be proved that ants are the normal hosts of species of *Scleroderma*.

Since these wasps are commonly associated with wood-boring insects, they not uncommonly are found in wooden buildings. There are many records of the females stinging humans. Some of the fairly extensive literature on *Scleroderma* attacking man has recently been reviewed by Guiglia (1958).

Distribution. — Cosmopolitan.

Included species. — Kieffer (1914) recognized over 40 species from various parts of the Old World, and several have been described since that time. Only six species have been described from the Americas, and a seventh is added here.

North America

carolinense (Ashmead), 1893, p. 43; ♀, North Carolina (New York to Georgia) (synonym: *virginiensis* Ashmead, 1893).

macrogaster (Ashmead), 1887, p. 75; ♀, Florida (north to Virginia, west to Texas).

soror Westwood, 1881, p. 123; ♀, Mexico (redescribed below).

West Indies

wilsoni Evans, n. sp. described below from ♀, Cuba.

South America

formicarius Kieffer, 1921, p. 41; ♀, Argentina.

galapagense Brues, 1919, p. 309; ♀, James Island, Galapagos.

iridomyrmicicola Bruch 1917a, p. 141; ♀, Argentina.

SCLERODERMA SOROR Westwood

Scleroderma soror Westwood, 1881, p. 123 [Type: ♀, MEXICO (no further data) (HCOU)].

Description of type female. — Length 2.0 mm; LH .40 mm; LT .65 mm. Entire body and appendages light yellowish brown; eyes dark gray. Head 1.25 X as long as wide, its sides rather evenly convex from front to rear, width at base of mandibles .8 X maximum width; vertex evenly convex; ocelli absent.

Eyes .5 X as long as WF, .3 X as long as WH. Front polished, obscurely alutaceous, without noticeable punctures. Scape 3.5 X as long as wide; flagellum about twice as long as scape, very slightly incrassate, segment eleven much wider than long, in fact all segments wider than long except first two and last.

Pronotal disc 1.4 X as long as wide; mesonotum .67 X as long as wide; median length of propodeum 1.4 X maximum width, maximum width 1.15 X minimum width, propodeum only slightly broadened posteriorly, its posterolateral angles not produced or angulate. Entire dorsum of thorax and propodeum shining, obscurely alutaceous, without noticeable punctures. Front femur 2.1 X as long as wide; middle tibiae apparently smooth. Wings and tegulae completely absent.

Remarks.—I have seen no specimens of this species other than the type.

SCLERODERMA WILSONI new species

Holotype.—♀, CUBA: Las Acostas, Pinar del Rio, 16 June 1953 (E. O. Wilson) [MCZ, No. 30,813].

Description of type female.—Length about 2.2 mm; LH .43 mm; LT .65 mm. Head and thorax wholly bright testaceous except posterior half of propodeum paler, straw-colored; eyes dark gray; antennae and legs wholly testaceous; abdomen piceous. Clypeus weakly emarginate, with a strong median carina. Head 1.20 X as long as wide, its sides subparallel except arcuately convergent behind; vertex evenly rounded; ocelli absent. Eyes .62 X as long as WF, .30 X as long as WH; distance from tops of eyes to top of vertex about twice HE. Entire head and thorax polished, very weakly alutaceous, punctures minute and scarcely noticeable. Scape about 2.5 X as long as wide; flagellum slightly more than twice as long as scape, very slightly thickened toward the apex, antennal segments four through twelve each wider than long.

Pronotal disc slightly longer than its maximum width; mesonotum .70 X as long as wide; median length of propodeum 1.35 X maximum width, maximum width 1.15 X minimum width; propodeum only weakly broadened posteriorly, its posterior dorsal angles blunt. Upper surface of middle tibia densely covered with very short spines. Wings and tegulae entirely absent.

Remarks.—This species is known to me only from the type. It is distinctively colored, and also differs from *soror* and *macro-gaster* in details of the shape of the head and of the propodeum.

III. SUBFAMILY BETHYLINAE

Subfamilial characters.— Small wasps without strong sexual dimorphism; both sexes occasionally short-winged or subapterous, but wings never completely absent. Maxillary palpi with five or six segments, labial palpi with two or three segments; clypeus with a prominent angular, subangular, or somewhat rounded median lobe, with a median polished streak or carina which extends on up the lower front usually well above level of bottoms of eyes; antennae with 12 or 13 segments, flagellum somewhat moniliform; eyes glabrous or with very short hairs; occipital carina absent. Pronotum smooth, without carinae or rugae; tegulae always present and scutellum separated from scutum; scutellum usually not in contact with base of propodeum, the metanotum present as a narrow, simple transverse band; propodeum with or without a transverse carina margining the disc behind, without a well-defined median carina (at least in the American forms) though often somewhat elevated medially; front femora somewhat broadened and flattened, especially in female; legs completely without spines; claws very strongly curved, hook-like, deeply bifid or trifid. Fore wings (except in brachypterous and subapterous forms) with three closed basal cells (costal cell sometimes partially obliterated) and a closed or open marginal cell; basal vein always giving rise to a vein (base of cubitus) which may be very short or fairly long and which may join the discoidal vein to form an areola (first discoidal cell); a closed submarginal cell present in some genera; hind wing with a strong notch on the anterior margin near the base.

Included genera.— This group is readily separated from other Bethylidae provided one removes certain discordant genera included here by Kieffer (1914), most particularly *Kathepyris* and *Clystospennella*. Of the five genera occurring in the Americas, two are restricted to this hemisphere (*Lytopsenella* and *Prosierola*), one is Holarctic (*Bethylus*), and two are cosmopolitan (*Parasierola* and *Goniozus*). Old World genera not occurring in the Americas include *Eupsenella*, *Sicrola*, *Odontepyris* and *Trissomalus*.

KEY TO GENERA OF BETHYLINAE

1. Antennae with twelve segments; frequently brachypterous or microp-
terous, when fully winged with the basal vein forming almost a
right angle, its basal portion appearing as a continuation of the
median vein, transverse median vein thus far basad of the apparent
basal vein (Fig. 142) 5. BETHYLUS Latreille, p. 202

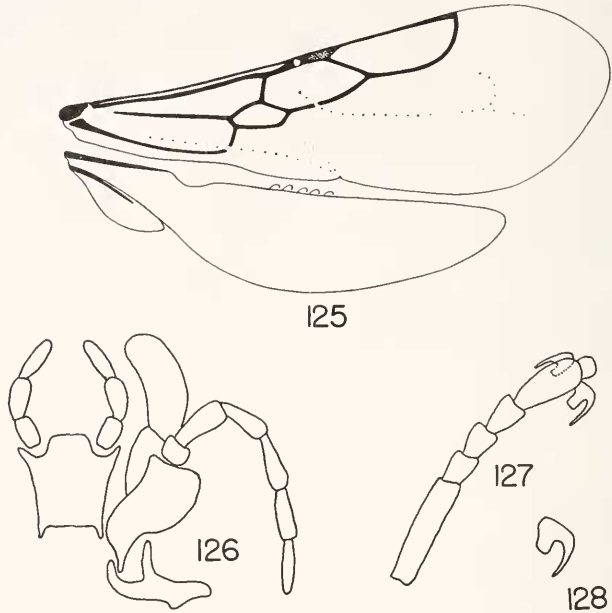
- Antennae with thirteen segments; almost always fully winged, the basal vein oblique, only slightly angled, leaving median vein at about the same point as the transverse median vein (Figs. 125, 139) 2
2. Fore wing with six closed cells, including closed marginal and submarginal cells (Fig. 125); subcosta only slightly thickened beyond junction of basal vein (always fully winged) 1. LYTOPSENELLA Kieffer, p. 181
- Fore wing with at most four closed cells, marginal cell always open apically and on wing margin, submarginal cell absent (Figs. 129, 139); subcosta strongly thickened beyond junction of basal vein (except in the one known brachypterous form) 3
3. Vein arising from basal vein not enclosing a cell, merely extending blindly downward (Fig. 139) 4. GONIOZUS Foerster, p. 199
- Vein arising from basal vein joining the discoidal vein to form a small closed cell (Figs. 129, 135) 4
4. Propodeum with a pair of median basal pits, also with a pair of more lateral ridges which converge behind, depressed just mesad of the ridges (Fig. 130); scutellar pits large; prostigma nearly parallel-sided (barely justifying the term prostigma) (Fig. 129) 2. PROSIEROLA Kieffer, p. 183
- Propodeum simple, without basal pits or converging ridges (the latter sometimes weakly developed) (Fig. 136); scutellar pits very small; prostigma strong, subtriangular (Fig. 135) 3. PARASIEROLA Cameron, p. 195

1. Genus LYTOPSENELLA Kieffer

Lytopsenella Kieffer, 1911, p. 203 (type species *Eupsenella herbsti* Kieffer, original designation). —Kieffer, 1914, pp. 554-555.

Generic characters.—Small wasps (2-4 mm), of predominantly black coloration, fully winged. Maxillary palpi with six segments, the basal segment very short; labial palpi with three segments; mandibles with four apical teeth; clypeus angularly produced medially, with a very strong, sharp median ridge which is arched in profile and which extends up the front well beyond the level of the bottoms of the eyes; eyes glabrous or with short hairs; antennae 13-segmented. Pronotum simple, of moderate length; notauli present on posterior half of mesoscutum; scutellum with a very slender transverse groove at base which connects a pair of small, widely separated pits; propodeal disc not margined behind and only indistinctly so laterally, without discal carinae; claws deeply bifid, inner ray in the form of a lobe which on the front tarsal claws is stronger and less widely separated from the apical ray. Fore wings with six closed cells (costal, median, submedian, first discoidal, first

submarginal, and marginal) ; costal vein weak but present to end of marginal cell, radial vein curving up to close off marginal cell apically, the marginal cell longer than the first submarginal cell; basal vein meeting subcosta basad of stigma by about length of stigma, subcosta somewhat thickened beyond junction of basal vein, but not expanded to form a prostigma. Abdomen sessile, shining, somewhat depressed. (Males unknown.) (Figs. 125-128.)



Lytopsenella herbsti (Kieffer). Fig. 125. Fore wing, female. Fig. 126. Labium and maxilla, female. Fig. 127. Front tarsus, female. Fig. 128. Hind tarsal claw, female.

Remarks.— This genus is very similar to *Eupsenella*, from Australia, differing chiefly in having the marginal cell longer and with its apex on the wing margin; it is also very similar to *Sierola*, another Australian genus having a very similar marginal cell but lacking a closed submarginal cell. Kieffer's description and figure of the fore wing of *Lytopsenella* are highly misleading, as he indicates that the costa is absent and the costal and marginal cells open on the wing margin, which is by no means true. This genus and *Eupsenella* have the largest number

of fully closed cells on the fore wing of any bethylid. Since the marginal cell of *Eupsenella* is slightly reduced and modified, one may safely say that *Lytropsenella* is the most primitive genus of living Bethylidae with respect to the wing venation.⁵

Biology.—Nothing has been recorded regarding the biology of these wasps. In the MCZ collection there is a specimen of *L. herbsti* (Kieffer) taken by Luis E. Peña at Valle Ramón, Chile, labeled as having been taken while attacking an adult cantharid beetle. This is a most unusual record, as I know of no other bethylids which attack adult insects, and nearly all other records indicate that members of this subfamily attack Lepidoptera.

Distribution.—Chile.

Included species.—Only the two following:

herbsti (Kieffer), 1904c, p. 142; ♀, Chile (Concepcion).

testaceicornis (Kieffer), 1910b, p. 54; ♀, Chile (Rengotai).

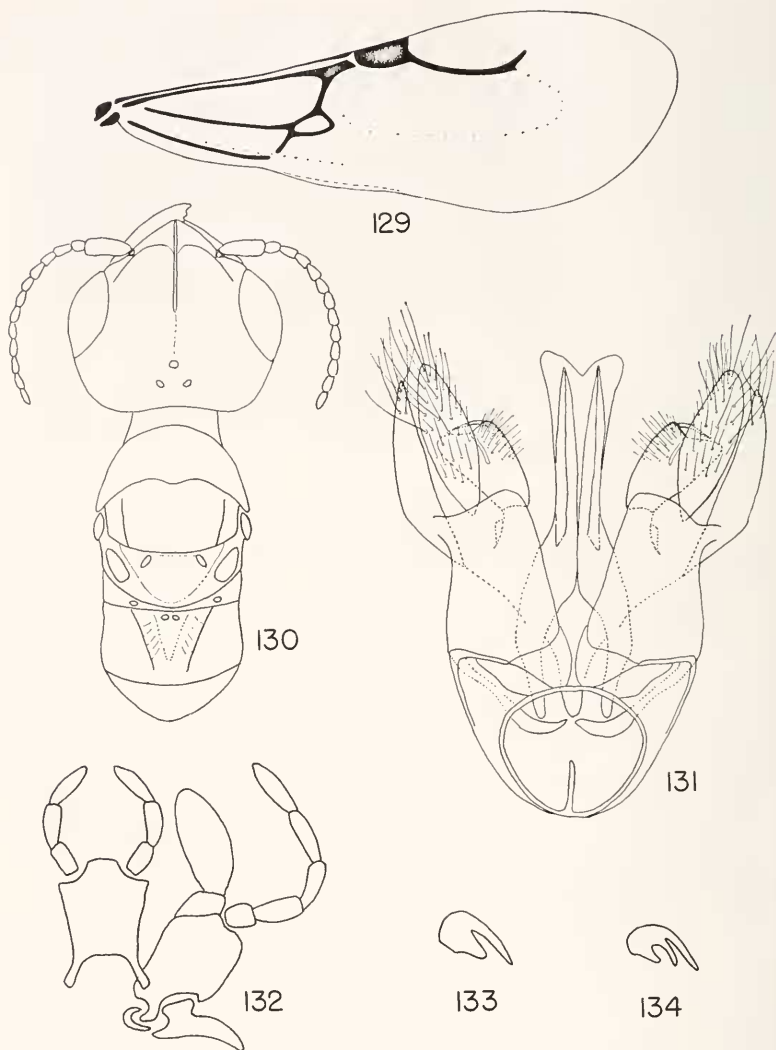
2. Genus PROSIEROLA Kieffer

Parasierola Kieffer, 1905a, p. 104 (in part; not Cameron, 1883, misidentification). —Kieffer, 1914, pp. 542-544 (in part). —Muesebeck and Walkley, 1951, p. 734.

Prosierola Kieffer, 1905b, p. 243 (type species *Epyris ? nasalis* Westwood, monobasic). —Kieffer, 1908a, p. 13. —Kieffer, 1914, p. 544-545.

Generic characters.—Length 2.5-5.5 mm; body color black or partially rufo-testaceous; wings fully developed. Maxillary palpi with five segments, labial with three; mandibles with four apical teeth; clypeus large, angular or subangular apically, weakly tectiform and with a median carina which continues on well up the front, often to about the level of the middle of the eyes, sometimes indistinctly to the anterior ocellus; eyes glabrous; antennae 13-segmented. Pronotum short, its posterior margin sinuate, slightly produced backward medially; notauli absent; scutellum with a pair of fairly strong basal pits connected by a shallow impression; propodeal disc very short, nearly twice as wide as long, margined laterally and also with a complete transverse carina behind; disc with a pair of small, round pits at the extreme base medially, behind the pits roundly elevated, on each side of the elevation depressed, these depressions margined laterally by ridges which converge behind; mesopleura prominent, with a large pit above; claws of female

⁵ The three species of *Sierola* described by Brues (1923) from Baltic Amber, some specimens of which are beautifully preserved, all belong to the genus *Lytropsenella*.



Prosierola bicarinata (Brues). Fig. 129. Fore wing, female. Fig. 130. Head and thorax, female. Fig. 131. Male genitalia, ventral aspect. Fig. 132. Labium and maxilla, female. Fig. 133. Hind tarsal claws of female. Fig. 134. Hind tarsal claws of male.

strongly hooked, deeply bifid, the inner ray lobe-like; claws of male trifid. Fore wing with four closed cells, the cubital and discoidal veins forming an areole, but the marginal cell open apically and on the wing margin, submarginal cell absent; subcosta thick and heavily pigmented beyond junction with basal vein, but usually nearly parallel-sided, the prostigma not as distinctly subtriangular as in *Parasierola*. Abdomen sessile, fusiform, shining. Abdomen of male with the apical sternites fringed with setae, the fifth sternite with a pair of tufts of more or less compacted setae; subgenital plate with its apical margin somewhat sinuate, but without a median notch; genitalia with the parameres divided into dorsal and ventral lobes, aedeagus slender, simple. (Figs. 129-134.)

Remarks.—This genus resembles *Parasierola* (*Perasierola* of many authors) in most particulars, but differs in the sculpturing of the propodeum and also in having the prostigma less strongly developed. Both of these characters show some variation in both *Proasierola* and *Parasierola*. In several species described below, the prostigma is nearly the same as in *Parasierola*, and in some species of *Parasierola*, such as *opaca* Cameron, there are weak, converging carinae on the propodeal disc. Hence there is some question in my mind as to whether the two groups should be maintained as separate genera. However, pending further study it is convenient to do so.

Biology.—*P. bicarinata* Brues is reported by Muesebeck and Walkley (1951) to attack *Laspeyresia caryana*, the hickory shuckworm (Lepidoptera, Olethreutidae). *P. cubana* n. sp. has been reared from a lepidopterous host, doubtfully determined as of the genus *Jocara* (Pyraloidea). Specimens of *P. lata* (Cameron) in the USNM are pinned with the cocoons of a lepidopterous leaf-roller or leaf-tier.

Distribution.—Neotropical region, north to Florida and Texas. I question whether the Australian and Indian species placed by Kieffer (1914) and by Muesebeck (1934) in *Parasierola* belong to either that genus or to *Proasierola*.

Included species.—The following eight species are known:

bicarinata (Brues), 1907a, p. 100; ♀, Texas (also Georgia, Florida) (new combination).

cubana Evans, n. sp. described below from ♀, ♂, Cuba (sp. 1).

insularis Evans, n. sp. described below from ♀, Dominican Republic (sp. 2)).

- lata* (Cameron), 1888a, p. 454; ♀, Panama (also Brazil, Paraguay, Tobago; redescribed below, sp. 4) (new combination).
- nasalis* (Westwood), 1874, p. 162; ♀, Brazil (redescribed below, sp. 3).
- obliqua* Evans, n. sp. described below from ♀, Bolivia (also ♀, ♂, Paraguay) (sp. 6).
- rufescens* Evans, n. sp. described below from ♀, Paraguay (sp. 5)
- variegata* Evans, n. sp. described below from ♀, Panama (sp. 7).

KEY TO SPECIES OF *PROSIEROLA*

1. Scutellar pits small, subcircular, widely spaced, separated by at least twice their own maximum diameters; propodeal pits small, subcircular, contiguous; sides of median elevation of propodeum at most very weakly ridged (Greater Antilles and southern United States)2
- Scutellar pits larger, separated by less than twice their own maximum diameters; propodeal pits not usually as above; sides of median elevation of propodeum with distinct ridges (South America, southern Lesser Antilles, Panama)4
2. Prostigma not well developed, the subcosta nearly parallel-sided beyond junction with basal vein; head of female barely if at all longer than wide; mesoscutum weakly shining (United States)*bicarinata* (Brues)
- Prostigma short, thick, subtriangular; head of female distinctly longer than wide (WH about .95 X LH); mesoscutum more strongly shining than pronotum (Greater Antilles)3
3. Head and thorax wholly pale testaceous, abdomen castaneous; vertex of female gently concave as seen from in front; punctures of front rather small (Cuba)(1) *cubana* n. sp.
- Body blackish except anterior third of head testaceous; middle and hind legs dark brown except tibiae and tarsi lighter brown; punctures of front larger, flat-bottomed (Hispaniola)(2) *insularis* n. sp.
4. Head about as long as, or longer than, wide; scutellar pits subcircular, separated by 1.5-1.8 X their own diameters; mesopleura, as seen from above, less strongly produced than below; smaller species (LFW generally under 3.2 mm) of dark coloration5
- Head distinctly wider than long (WH at least 1.03 X LH); scutellar pits elliptical, longer than wide, or if nearly circular then separated by barely more than their own diameters; mesopleura, as seen from above, strongly, angularly produced; larger species (LFW generally more than 3.2 mm) of variable coloration6
5. Head much longer than wide, its anterior portion strongly produced (WH .93 X LH); legs dark brown, tibiae and tarsi paler (Brazil).(3) *nasalis* (Westwood)

- Head not or barely longer than wide, less strongly produced anteriorly (LH .96-1.02 X WH); legs of variable coloration, rarely as dark as above (Panama and Tobago to Brazil and Paraguay) (4) *lata* (Cameron)
6. Scutellar pits subcircular, separated by barely more than their own diameters; vertex distinctly concave in anterior view (males unknown) (Paraguay) (5) *rufescens* n. sp.
- Scutellar pits elliptical, oblique, separated by 1.2-1.7 X their own maximum diameters (in known males, by no more than their own diameters); vertex broad, somewhat sinuate 7
7. Body piceous to black, except the clypeus dull rufous, the legs and antennae mainly testaceous; head and thoracic dorsum, especially the mesoseutum and scutellum, somewhat more shining than below; median elevation of propodeum gently rounded (Bolivia, Paraguay) (6) *obliqua* n. sp.
- Body castaneous, the head and thorax somewhat darker than the propodeum and abdomen, legs and antennae testaceous; head and thoracic dorsum rather evenly alutaceous, weakly shining; median elevation of propodeum strong, rather narrowly rounded (Panama) (7) *variegata* n. sp.

(1) *PROSIEROLA CUBANA* new species

Holotype. — ♀, CUBA: Santiago de las Vegas, 4 April 1935 (S. C. Bruner; “*ex Jocara ferrififusalis*,” also labeled “reared from *Jocara?*”) [USNM, No. 67,129].

Description of type female. — Length 3.7 mm; LFW 2.7 mm. Head and thorax entirely bright, pale testaceous, including legs and antennae, except the eyes dark gray, the tips of the mandibles and apical margin of the clypeus rufous; abdomen shining, castaneous, irregularly suffused with testaceous, more especially toward the base; wings subhyaline, veins and stigma brown. Clypeus obtusely angulate, with a median ridge which is arched in profile and which continues on up the front to a point slightly below the middle of the eyes. Antennae short, the apical two-thirds moniliform. Front dull, rather strongly alutaceous, with rather small punctures which are separated by 1-2 X their own diameters; under surface of head more shining. WH .95 X LH; WF .63 X WH, 1.40 X HE; OOL 1.8 X WOT; vertex located above eye tops by a distance equal to about three-fourths X HE, the vertex gently concave as seen from in front.

Thoracic dorsum weakly punctate, the mesonotum more shining than the pronotum; scutellar pits well separated, subcircular, separated by 2.2 X their own diameter, connected by a shallow groove. Propodeal disc 1.9 X as wide as long, its basal pits

oblique, contiguous; sides of the median elevation very weakly striate toward the base. Mesopleura moderately prominent as seen from above. Fore wing with the areola rather slender, subtriangular; prostigma short, subtriangular.

Allotype. — ♂, same data as type [USNM].

Description of male allotype. — Length 2.5 mm; LFW 1.9 mm. Coloration as in female. Head with eyes somewhat more bulging than in female, the vertex straight across rather than concave; WH 1.0 X LH; WF .61 X WH, 1.28 X HE; OOL 1.5 X WOT. Other features of head and thorax essentially as in female. Abdomen relatively broad and short, with a rather large apical genital orifice; apical sternites with apical fringes of setae; fifth sternite with the usual pair of small hair-tufts. Terminalia not studied.

Paratypes. — CUBA: 4 ♀♀, same data as type [USNM, MCZ].

Variation. — The four female paratypes resemble the type closely. LFW varies from 2.4 to 2.8 mm; WF varies from 1.35 to 1.40 X HE; OOL varies from 1.65 to 1.85 X WOT.

Remarks. — The type alone bears the specific host data indicated above; all the specimens bear the label "Reared *Jocara*?". Two of the females are pinned with cocoons, presumably those of the host.

(2) *PROSIEROLA INSULARIS* new species

Holotype. — ♀, DOMINICAN REPUBLIC: San José de las Matas, 1000-2000 feet, June 1938 (P. J. Darlington, Jr.) [MCZ, No. 30,814].

Description of type female. — Length 4.3 mm; LFW 2.9 mm. Head and thorax black, abdomen dark reddish brown, almost black; mouthparts, clypeus, front anterior to level of bottoms of eyes, and entire antennae bright testaceous; front legs entirely testaceous, but middle and hind legs dark brown except light brown beyond femora; wings very lightly tinged with brownish, more especially along the veins and on the apical half, veins brown, stigma and prostigma dark brown. Mandibles with four small, sharp teeth. Median lobe of clypeus very prominent, subangular, median ridge strong, arched in profile, continuing up front to about middle of eyes and then as a faint streak to the median ocellus. Antennal scrobes carinate. First four antennal segments in a ratio of about 17:6:7:7, segments three and eleven each about 1.5 X as long as wide. Front strongly alutaceous,

especially below, with large, shallow, flat-bottomed punctures which are separated by 1-3 X their own diameters. Head slightly wider than maximum width of thorax; WH .95 X LH; WF .63 X WH, 1.44 X HE. Front angle of ocellar triangle slightly less than a right angle; OOL 1.45 X WOT.

Pronotum rather strongly alutaceous, its posterior margin arcuately produced medially. Mesoscutum with large, shallow punctures, less strongly alutaceous than pronotum; pits at base of scutellum subcircular, rather small, separated by slightly more than twice their own diameters, connected by a shallow groove. Propodeal disc about twice as wide as long, much as described for *rufescens* except the posterior carina only rather weakly curved. Mesopleura moderately produced on the upper part, just behind the rather large pit, but less prominently so than in *rufescens*. Fore wing with prostigma subtriangular, actually as well developed as in some species of *Parasierola*; areola small, subtriangular.

Remarks.— This species is known only from the type.

(3) *PROSIEROLA NASALIS* (Westwood)

Epyris ? *nasalis* Westwood, 1874, p. 162, pl. 31, fig. 2 [Type: ♀, BRAZIL (no further data) (HCOU)].

Parasierola nasalis Kieffer, 1905a, p. 104.

Prosierola nasalis Kieffer, 1905b, p. 243. —Kieffer, 1914, p. 545.

Description of type female.— Length 4.7 mm; LFW 3.0 mm. Black; mandibles light brown; clypeus dull ferruginous; antennae light brown, almost straw-colored, except scape and apical few segments weakly suffused with darker brown; legs dark brown except tibiae and tarsi amber; wings hyaline, veins and stigma dark brown. Mandibles with four small apical teeth. Median lobe of clypeus very prominent, narrowly rounded, the apex obtusely angulate; median line elevated as a sharp ridge which is arcuate in profile, continued on up front to a point opposite middle of eyes. First four antennal segments in a ratio of about 16:7:7:7, segment three about 1.4 X as long as thick, segment eleven about 1.3 X as long as thick; outer part of flagellum distinctly moniliform. Front alutaceous, moderately shining, with large, shallow punctures which are separated by 1-2 X their own diameters. Head relatively narrow, WH .93 X LH; WF .60 X WH, 1.25 X HE. Front angle of ocellar triangle less than a right angle; OOL 1.60 X WOT.

Pronotum of moderate length, its posterior margin weakly produced backward medially; surface alutaceous, somewhat punctate. Mesoscutum polished, barely alutaceous, punctures obsolescent; scutellum with the basal pits round, separated by 1.7 X their own diameters, connected by a very shallow depression. Propodeal disc 1.8 X as wide as long, with a strong, complete transverse carina behind; base with a pair of circular median pits; median area roundly elevated and strongly polished, flanked by broad depressions which are margined laterally by strong, complete, oblique ridges. Fore wing with the prostigma small, parallel-sided, although heavily pigmented like the stigma; areola subtriangular.

Remarks.—I have seen no specimens of this species other than the type. This species differs from *lata* in the coloration of the legs and wings, also in head shape.

(4) *PROSIEROLA LATA* (Cameron) new combination

Parasierola lata Cameron, 1888a, p. 454, pl. 19, fig. 21 [Type: ♀, PANAMA: Bugaba (G. C. Champion) (BMNH)].

Perasierola lata Kieffer, 1914, p. 539.

Description of type female.—Length 5.0 mm; LFW 3.0 mm. Black; mandibles and clypeus pale castaneous; antennae pale castaneous except apical third weakly infuscated; legs bright rufo-testaceous except coxae somewhat infuscated; wings with a faint luteous tinge, fore wings somewhat clouded on apical half, most noticeably so just below radial vein. Mandibles with four apical teeth; clypeus produced as a right angle, the tip of which is somewhat rounded; median ridge strongly arched in profile, continued up the front as a carina to about the level of the middle of the eyes. First four antennal segments in a ratio of about 21:7:8:7, segment three 1.7 X as long as thick, segment eleven 1.5 X as long as thick; outer part of flagellum distinctly moniliform. Front alutaceous, moderately shining, punctures large although shallow, separated by 1.2 X their own diameters. Head slightly wider than thorax; WH .98 X LH; WF .60 X WH, 1.23 X HE; vertex straight across. Front angle of ocellar triangle less than a right angle; OOL 1.55 X WOT.

Pronotum short, disc along midline subequal in length to mesoscutum; posterior margin distinctly produced backward medially; surface alutaceous, with widely spaced punctures. Mesoscutum less alutaceous and more shining than pronotum or front, punctures obsolescent; base of scutellum with two round,

bowl-shaped pits which are separated by 1.5 X their own diameters, connected by a very shallow depression. Propodeal disc 1.9 X as wide as long, with a strong, complete transverse carina behind; base with a pair of prominent, circular median pits; median area elevated, polished, flanked by broad depressions which terminate at a pair of oblique ridges. Mesopleura gibbous on upper part, and with a large pit. Fore wing with the prostigma small, parallel-sided; areola subtriangular.

Plesiallotype. — ♂, PARAGUAY: San Bernardino (K. Fiebrig) [USNM].

Description of plesiallotype male. — Length 3.0 mm; LFW 2.5 mm. Body wholly deep castaneous; mouthparts straw-colored except tips of mandibles rufous; clypeus testaceous, with a narrow dark border; antennae and legs wholly testaceous; fore wing very faintly clouded on apical half, wings otherwise hyaline. Features of head in general similar to female, but eyes somewhat more bulging, vertex narrower; WH 1.0 X LH; WF .59 X WH, 1.25 X HE; OOL 1.45 X WOT. Mesonotum more strongly shining than pronotum or front, as in female; scutellar pits slightly longer than wide, separated by 1.8 X their own maximum diameters. Abdominal venter obscured by glue, apparently with fringes and tufts of setae much as in *cubana* and *bicarinata*. Terminalia not studied.

Other specimens examined. — PARAGUAY: 7 ♀♀, same data as plesiallotype, one female pinned with cocoons of a lepidopterous leaf-roller or leaf-tier [USNM, MCZ]. BRAZIL: 1 ♀, Chapada, April [CM]; 1 ♀, Nova Teutonia, Santa Catarina, Mar. 1963 (F. Plaumann) [MCZ]. TOBAGO: 1 ♀, 23 Feb. 1912 (A. Busck) [USNM].

Variation. — Size variation among the females is slight (LFW 2.7-3.2 mm). There is little color variation except that the legs, although usually wholly testaceous, sometimes have the coxae and femora light to medium brown (in four of the Paraguay specimens) or even dark brown (in the Santa Catarina specimen). In some specimens the median carina of the front continues as a faint line to the anterior ocellus; the front varies from moderately to strongly alutaceous except in one Paraguay specimen, where it is polished and very weakly alutaceous. WH varies from .96 to 1.02 X LH; WF varies from 1.17 to 1.27 X HE; OOL varies from 1.4 to 1.7 X WOT. The scutellar pits are often slightly longer than wide and are separated by from 1.4 to 1.8 X their own maximum diameters.

(5) *PROSIEROLA RUFESCENS* new species

Holotype. — ♀, PARAGUAY: Carlos Pffanel, March (F. Schade) [MCZ, No. 30,815].

Description of type female. — Length 5.5 mm; LFW 3.8 mm. Front of head piceous, except suffused below and on the sides with rufo-castaneous, under side of head wholly rufo-castaneous; thorax and abdomen piceous; palpi and mandibles testaceous; clypeus and adjacent parts of front pale castaneous; antennae testaceous, weakly darkened apically; legs wholly testaceous; wings strongly tinged with yellowish, weakly clouded below stigma and radial vein, stigma and prostigma brown but veins otherwise amber and translucent. Mandibles with four teeth. Median lobe of clypeus rather narrow, forming nearly a right angle, median carina weakly arched in profile, extending up front not quite to level of middle of eyes; antennal scrobes carinate above. First four antennal segments in a ratio of about 21:7:9:9, segment three about 1.7 X as long as thick, segment eleven about 1.9 X as long as thick. Front alutaceous, moderately shining, punctures small but strong, less shallow than in *lata* and *nasalis*, separated by 1-2 X their own diameters; head subcarinate between anterior ocellus and vertex crest. Head subequal in width to maximum width of thorax (at mesopleura), much wider than pronotum; WH 1.06 X its median length, the vertex being slightly concave in anterior view; WF .61 X WH, 1.35 X HE. Front angle of ocellar triangle about a right angle; OOL 1.45 X WOT.

Posterior margin of pronotum arcuately produced backward medially; surface alutaceous, obscurely punctate. Mesoscutum less alutaceous and with more distinct punctures than pronotum; pits at base of scutellum large, subcircular, separated by scarcely more than their own diameter. Propodeal disc 1.7 X as wide as its median length, the posterior carina strongly arched backward medially; median area strongly elevated, the basal pits rather shallow, sides of median area strongly striate. Mesopleura strongly produced on upper part, the processes as seen from above almost dentiform, as seen from in front or behind strongly rounded, each process with a strong pit in front of it. Fore wing with prostigma strongly pigmented although essentially parallel-sided; areola subtriangular.

Paratypes. — PARAGUAY: 2 ♀ ♀, same data as type [MCZ, USNM].

Variation.—The two paratypes are of the same size as the type, but both are somewhat paler, one of them having the entire body bright rufo-castaneous except for some infuscation of the pronotum, propodeum, and abdomen. In the paratypes the antennae are slightly shorter, segment eleven measuring 1.5-1.7 X as long as wide, but there are no other important differences in structure or body measurements.

(6) *PROSIEROLA OBLIQUA* new species

Holotype.—♀, BOLIVIA: Santa Cruz, Roboré, Oct. 1959 [KU].

Description of type female.—Length 4.0 mm; LFW 3.2 mm. Head black except clypeus ferruginous, with a black apical border; mandibles testaceous; antennae testaceous except weakly darkened apically; thorax piceous, grading into dark reddish brown on parts of the prothorax and propodeum; tegulae light brown; legs entirely bright, pale castaneous; abdomen shining, piceous, obscurely banded with yellowish brown; wings wholly tinged with yellowish brown. Mandibles with four teeth; clypeus rounded at tip, its median carina weakly arched, continued up the front well above level of middle of eyes. First four antennal segments in a ratio of about 19:7:7:8, segments three and eleven each about 1.4 X as long as thick. Front alutaceous, moderately shining, punctures strong but not as large as in *lata*, separated by from 1.5-3 X their own diameters. WH 1.05 X LH; WF .60 X WH, 1.32 X HE; vertex broad, slightly sinuate; OOL 1.7 X WOT.

Thoracic dorsum shining, moderately alutaceous, with small, widely spaced punctures; pits at base of scutellum deep, elliptical, oblique, separated by 1.4 X their own maximum length. Propodeal disc 1.8 X as wide as long, its basal pits small, transverse; median area elevated, polished, with a few irregular carinae on the sides; transverse carina strong and complete. Upper part of mesopleura strongly produced, so that in dorsal view the pleura protrude greatly from the sides of the thorax. Fore wing with the areola small, subtriangular, the prostigma darkly pigmented but slender and nearly parallel-sided.

Allotype. ♂, PARAGUAY: San Bernardino (K. Fiebrig) [USNM].

Description of allotype male.—Length 4.0 mm; LFW 3.0 mm. Body piceous except clypeus testaceous, with a dark border, tip of abdomen dark yellowish brown; mouthparts testaceous except

tips of mandibles rufous; antennae and legs wholly testaceous; wings faintly tinged with yellowish brown. Head similar to that of female, but still broader, WH 1.08 X LH; WF .60 X WH, 1.33 X HE; OOL 1.4 X WOT; front moderately shining, alutaceous. Mesoscutum and scutellum alutaceous but rather strongly shining, with sparse, rather strong punctures; scutellar pits large, elliptical, oblique, separated by approximately their own maximum diameters. Abdominal sternites with apical fringes of setae, sternite five with the setae clumped on each side of the midline to form a pair of brushes; subgenital plate with a median longitudinal impression. Genitalia not studied.

Other specimens examined. — BOLIVIA: 2 ♀♀, Roboré, Santa Cruz (same data as type) [KU, MCZ]; 1 ♀, Rurrenabeque, Beni, 175 meters, 17 Oct. 1956 (L. Peña) [KU]. PARAGUAY: 3 ♀♀, San Bernardino (same data as allotype) [USNM].

Variation. — The two topotypic paratypes show no noteworthy differences from the type, but all the others are larger (LFW 3.8-4.0 mm). WH varies from 1.03 to 1.06 X LH, WF from .60 to .63 X WH, 1.20 to 1.40 X HE; the distance between the scutellar pits varies from 1.2 to 1.4 X their own maximum diameters.

(7) *PROSIEROLA VARIEGATA* new species

Holotype. — ♀, PANAMA: Ancon, Canal Zone, 1 Oct. 1923 (J. Zetek, no. Z-2306) [USNM, No. 67,130].

Description of type female. — Length 5.0 mm; LFW 3.5 mm. Head dark castaneous, center of front nearly piceous, except clypeus testaceous, with a darker border; thorax dark castaneous except lower pleura and entire propodeum paler castaneous; abdomen light castaneous, with indistinct transverse banding with dark castaneous; mouthparts straw-colored except tips of mandibles rufous; antennae straw-colored except apical third suffused with brownish; legs wholly testaceous except tarsal claws dark; wings lightly suffused with yellowish brown, especially around the radial vein. Clypeus narrowly rounded, its median carina weakly arched in profile, extending up front nearly to level of top of eyes, then as a weak line to anterior ocellus. Antennae of moderate length, fourth segment slightly longer than second or third, apical half strongly moniliform. Front moderately shining, rather uniformly alutaceous, punctures rather small, separated by 2-3 X their own diameters,

under surface of head strongly shining except alutaceous just behind mouthparts. WH $1.04 \times$ LH; WF $.62 \times$ WH, $1.42 \times$ HE; OOL $1.55 \times$ WOT; vertex broad, distance from eye tops to vertex crest equal to about two-thirds \times HE; vertex slightly concave, as seen from in front, but with a weak median convexity.

Thoracic dorsum rather evenly alutaceous, including the rather flat scutellar disc, moderately shining; scutellar pits oblique, elliptical, separated by $1.7 \times$ their own maximum diameters. Propodeal disc about $1.7 \times$ as wide as high, the transverse carina somewhat arching; median basal elevation strong, rather narrowly convex, the basal pits transverse, separated by less than their own maximum diameters; sides of median elevation with some strong ridges. Mesopleura, as seen from above, strongly, subangularly produced. Fore wing with the areola and the prostigma both rather small, but the latter darkly pigmented like the stigma.

Paratypes. — PANAMA: 10 ♀♀, same data as type [USNM, MCZ].

Variation. — The type series was apparently reared, and there is little variation worthy of note. LFW varies from 3.3 to 3.6 mm; WH varies from 1.03 to $1.05 \times$ LH, WF from 1.40 to $1.50 \times$ HE; the scutellar pits vary from 1.5 to $1.8 \times$ as far apart as their own diameters. The infuscation of the wings varies slightly in intensity, and in one specimen the head and thorax are medium castaneous, hardly any darker than the abdomen.

Remark. — This form differs only slightly from *obliqua*, and it is possible that the two are only subspecifically distinct.

3. Genus PARASIEROLA Cameron

Parasierola Cameron, 1883, p. 197 (type species *P. testaccicornis* Cameron, monobasie). —Cameron, 1888a, pp. 454-455. —Kieffer, 1904b, p. 381. —Kieffer, 1905b, p. 243. —Kieffer, 1908a, pp. 13-14.

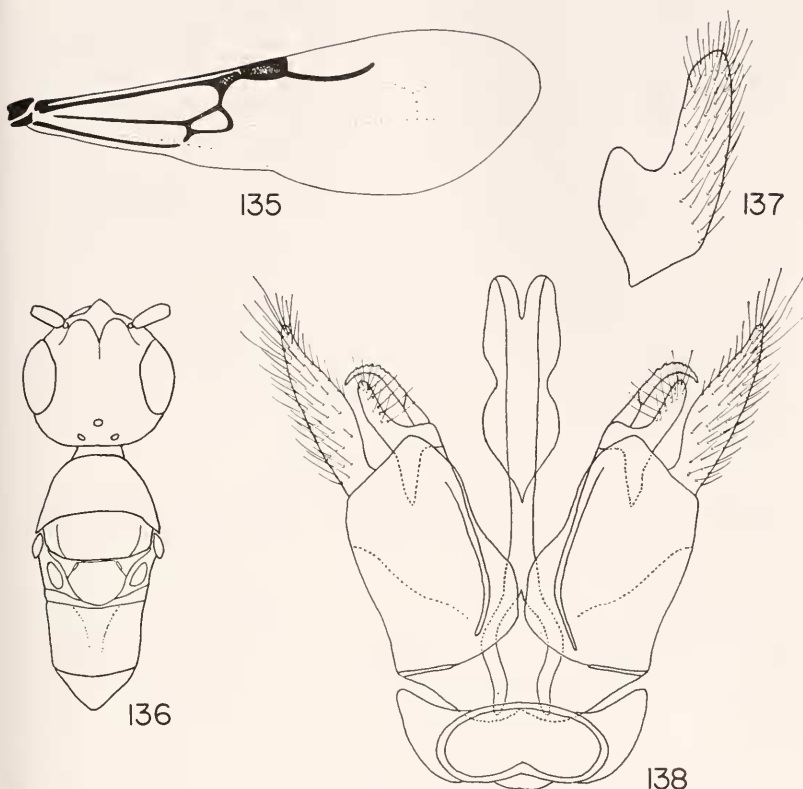
Perisierola Kieffer, 1914, pp. 533-542 (type species *Parasierola gallicola* Kieffer, designated by Muesebeck and Walkley, 1951; new synonymy). —Berland, 1928, pp. 102-103 (French spp.). —Muesebeck, 1934, p. 227 (Indian spp.). —Kurian, 1954, p. 286 (Indian spp.). —Muesebeck and Walkley, 1951, pp. 733-734 (U.S. spp. listed). —Benoit, 1957, pp. 4-6 (central African spp.).

Generic characters. — Small wasps (1.5-5.0 mm) of predominantly black coloration; fully winged except for one species described from Juan Fernandez. Maxillary palpi with five segments, labial with three (as figured for *Prosierola*, Fig. 132);

mandibles with several (usually four) small apical teeth; clypeus with a strongly produced angular or subangular median lobe, with a median, polished carina which extends up the front a short distance, usually not as far as middle of eyes; malar space rather long; eyes glabrous or with some very short, inconspicuous hairs; antennae 13-segmented. Posterior margin of pronotum arcuate or slightly sinuate; notauli absent; scutellum with a transverse basal groove or a pair of very small pits which are connected by a weak groove; propodeum margined laterally, the transverse carina margining the disc behind complete, incomplete, or occasionally nearly absent; disc roundly elevated medio-basally and usually more polished here than elsewhere, without other irregularities except sometimes for a pair of very weak carinae which converge posteriorly; mesopleura with a strong pit above; claws of female bifid, those of male trifid, as in *Prosierola*. Venation of fore wing as in the preceding genus, but the prostigma strong, subtriangular, darkly pigmented like the stigma. Abdomen shining, sessile, slightly depressed, that of male hirsute on apical sternites, but without slender processes as in *Prosierola*; male subgenital plate typically truncate and with a small median notch; male genitalia with the parameres undivided, though often with a weak dorsal lobe, cuspides and digiti slender, aedoeagus of variable shape. (Figs. 135-138.) (Ogloblin, 1953 and 1960, has provided excellent drawings of members of this genus, including the genitalia of three species.)

Remarks.—I have studied the type specimen of the type species of *Parasierola*, and I find it to be a typical *Perisierola* in the sense of Kieffer (1914) and subsequent authors, the median carina of the propodeum being no more than a rounded, polished elevation similar to that of many species of this genus. Thus *Parasierola* is a senior synonym of *Perisierola*, the name *Prosierola* properly applying to those species having paired pits and carinae on the propodeum.

Biology.—The species of this genus are commonly taken in sweepings from herbaceous vegetation, and are also often taken at honeydew, rarely on flowers. There are many records which indicate that the usual hosts are microlepidopterous larvae, including such pest species as the pink bollworm and the Oriental fruit moth. Busck (1917) studied *P. emigrata* Rohwer, which occurs in cotton fields in Hawaii and attacks the pink bollworm, *Pectinophora gossypiella* (Saunders) (Gelechiidae). The wasp enters the boll and paralyzes the full-grown bollworm larva by



Parasierola spp. Fig. 135. *P. cellularis* (Say), fore wing, female. Fig. 136. Same species, head and thorax, female. Fig. 137. *P. gracilicornis* Kieffer, lateral view of paramere of male genitalia (ventral surface toward right). Fig. 138. Same species, male genitalia, ventral aspect.

stinging it several times, then lays 4-10 eggs (in the laboratory, up to 17 eggs) in two longitudinal rows on the caterpillar. The eggs hatch within 24 hours and the larvae reach maturity in two or three days, spinning their cocoons near the host larva. Bridwell (1919) found *emigrata* to be associated with a variety of lepidopterous larvae in the field and to attack almost any small lepidopterous larvae presented to them in the laboratory (also some beetle larvae). He observed females feeding upon the blood exuding from the wounds of their hosts on many occasions.

The Neotropical species *nigrifemur* (Ashmead) is also reported to attack the pink bollworm as well as the tortricoid moth *Evetria buoliana* (Ogloblin, 1960), while *bogotensis* Kieffer has been reared from the sugar-cane borer (*Diatraea saccharalis*, Crambidae) (Myers, 1932). The Nearctic species *cellularis* (Say) and *puncticeps* Kieffer are recorded from several microlepidopterous hosts (Muesebeck and Walkley, 1951). Several Old World species have been found to attack the larvae of Microlepidoptera (for summaries of records, see Berland, 1928, Kurian, 1954, and Yamada, 1955). There are a few records of Coleoptera as hosts, but all are fragmentary. Rohwer (1917) mentions *emigrata* as a parasite of *Bruchus* in Texas, and Bridwell (1919), as mentioned above, found that this species would attack beetle larvae in the laboratory. A specimen of an undetermined species from California [CIS] is labeled as a parasite of *Ernobius punctulatus* LeC. (Anobiidae).

Males of this genus are uncommonly collected, and it is possible that thelytokous parthenogenesis is common in the genus. Busck (1917) was able to produce four generations of females from a single unfertilized female.

Distribution.—This genus is well represented in all zoogeographic regions. In this hemisphere the species collectively range from the northern United States to Argentina (but not Chile), including the West Indies. There are many undescribed species.

Included species:

United States

alutacea Kieffer, 1906b, p. 254; ♂, Nevada.

breviceps (Krombein), 1954, p. 259; ♀, California (new combination).

cellularis (Say), 1836, p. 279; ♀, Indiana (Virginia and Kansas to Pennsylvania and Michigan; Muesebeck and Walkley, 1951).

distinguenda Kieffer, 1908a, p. 14; ♀, California and Nicaragua (new name for *cellularis* Kieffer, 1906b, p. 254, *nec* Say).

emigrata (Rohwer), 1917, p. 1; ♀, Hawaii (♂ also described; said to be introduced into Hawaii from Texas).

gracilicornis Kieffer, 1906b, p. 254; ♀, California (Texas and California to Oregon and Idaho; Muesebeck and Walkley, 1951).

punctaticeps Kieffer, 1906b, p. 254; ♀, California (also Texas, Muesebeck and Walkley, 1951).

Mexico and Central America.—Eight species have been described, and *distinguenda* and *nigrifemur* are also reported from Nicaragua and Mexico, respectively.

arcuata Kieffer, 1911, p. 208; ♀, Mexico.

flavicoxis Kieffer, 1904b, p. 381; ♀, Nicaragua (♂ also described).

fuscicornis Kieffer, 1908b, p. 21; ♀, British Honduras.

leviceps Kieffer, 1905c, p. 11; ♀, Nicaragua.

mexicana (Ashmead), 1895a, p. 540; ♀, Mexico.

nigricoxis Kieffer, 1904b, p. 382; ♀, Nicaragua.

opaca Cameron, 1888a, p. 454; ♀, Guatemala.

palliditarsis Cameron, 1888a, p. 455; ♀, Guatemala.

West Indies

luteipes Kieffer, 1908b, p. 20; ♀, Cuba.

nigrifemur (Ashmead), 1894, p. 195; ♀, St. Vincent (occurs widely in neotropics, Ogloblin, 1960) (synonym: *bonariensis* Brèthes, 1916; Ogloblin, 1960).

sancti-vincenti (Ashmead), 1894, p. 196; ♀, St. Vincent.

South America.—In addition to the eight species listed below, see also *nigrifemur*, described from the West Indies.

bogotensis Kieffer, 1909, p. 140; ♀, Colombia (also British Guiana; Myers, 1932).

boliviensis Kieffer, 1910b, p. 55; ♂, Bolivia.

excisa Kieffer, 1910a, p. 292; ♀, Brazil.

integra Kieffer, 1910a, p. 292; ♂, Brazil.

maculicornis (Ogloblin), 1953, p. 106; ♂, Juan Fernandez (new combination).

peruviana Kieffer, 1910b, p. 55; ♀, Peru.

sanctae-clarae (Ogloblin), 1953, p. 108; ♂, Juan Fernandez (new combination).

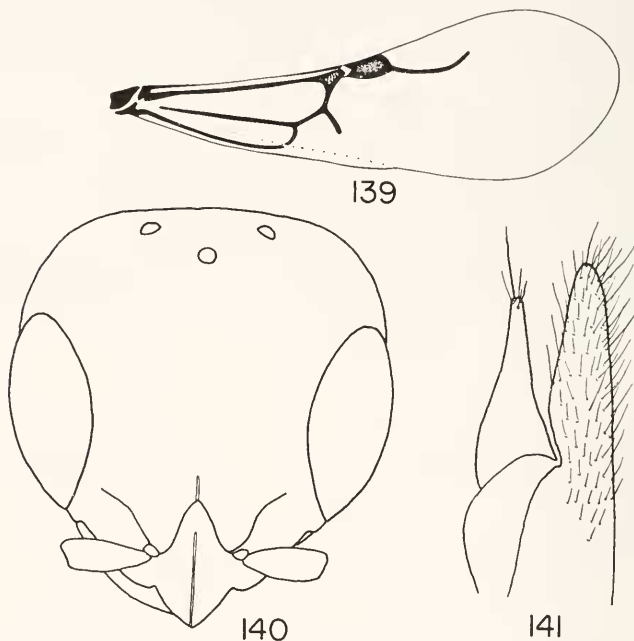
testaceicornis Cameron, 1883, p. 197; ♀, Brazil.

4. Genus GONIOZUS Foerster

Goniozus Foerster, 1856, p. 96 (type species *Bethylus claripennis* Foerster, designated by Ashmead, 1893). —Ashmead, 1893, pp. 72-77. —Ashmead, 1902, pp. 272, 273. —Kieffer, 1905b, pp. 244, 262-267 (European spp.). —Brues, 1907b, pp. 151-152 (key to U.S. spp.). —Kieffer, 1908a, pp. 14-15. —Kieffer, 1914, pp. 522-533 (spp. of world). —Berland, 1928, pp. 101-102 (French sp.). —Fouts, 1928, pp. 127-132 (key to U.S. spp.). —Kurian, 1955, pp. 113-130 (Oriental spp.).

Progoniozus Kieffer, 1905a, p. 105 (type species *Perisemus floridanus* Ashmead, original designation; synonymy by Muesebeck and Walkley, 1951). —Kieffer, 1914, pp. 519-522.

Generic characters. — Exactly as described for *Parasierola* except as follows: pits at base of scutellum and the groove connecting them very small, often obsolescent; wings fully developed in all known species, vein arising from basal vein very short to moderately long, directed obliquely downward, but not enclosing a cell inasmuch as the discoidal vein is absent; male subgenital plate sinuate apically, with a strong median notch; genitalia with the parameres completely divided into dorsal and ventral lobes (*cf.* Figs. 137 and 141). (Figs. 139-141.)



Goniozus platynotae Ashmead. Fig. 139. Fore wing, female. Fig. 140. Head of female. Fig. 141. Lateral view of paramere of male genitalia (ventral surface toward right).

Remarks. — There is some question in my mind as to whether this genus and *Parasierola* should be maintained as full genera, as they are nearly identical in structure and exhibit no known differences in biology. It is convenient to consider them full

genera for the present, as both groups are very large, and only a thorough revision of the species of this section of the Bethylinae can determine how these species should properly be grouped.

Biology.—The species of *Goniozus* occur in much the same situations as do those of *Parasierola*, and as in that genus most if not all of them attack Microlepidoptera. The most detailed study is that of Voukassovitch (1924) on the European species *claripennis* (Foerster). This species attacks tortricoid caterpillars, feeding at the oviposition punctures and laying from one to eight eggs on the host. Unfertilized eggs are said to produce males, which is the opposite of what Busck found to be true in a species of *Parasierola*. Iwata (1949) has published on the life history of *G. japonicus* Ashmead, a parasite of the persimmon leaf-roller in Japan. The papers of Kurian (1954, 1955) contain many host records for Oriental species, and Muesebeck and Walkley (1951) have presented many host records for the North American species. With a few minor and doubtful exceptions, all these host records are for Microlepidoptera, and the list includes many species of economic importance (in North America, the Oriental fruit moth, pistol casebearer, red-banded leaf roller, fruit-tree leaf roller, strawberry leaf roller, etc.). As in the other genera of Bethylinae, males are very much less common in collections than are females.

Distribution.—Cosmopolitan. Apparently no species have been described from South America, but the genus does occur on that continent at least as far south as Bolivia. Like *Parasierola*, this genus is a large one and much in need of revision.

Included species:

United States.—The following list of the 17 known U.S. species for the most part follows Muesebeck and Walkley (1951). A key to eleven of these species was presented by Fouts (1928).

brevinervis Fouts, 1928, p. 128; ♀, Ohio (also New Jersey).

castaneicolor Evans, new name for *castaneus* Kieffer, 1907, nec Kieffer, 1905c; ♀, "United States" (transferred to *Goniozus* by Evans, 1962a).

clarimontis Kieffer, 1906b, p. 253; ♀, California.

columbianus Ashmead, 1893, p. 76; ♂, District of Columbia (also New Jersey, Virginia, Utah) (synonym: *minimus* Ashmead, 1893, ♂).

- electus* Fouts, 1928, p. 132; ♀, Louisiana (♂ also described).
- flavipes* Fouts, 1928, p. 130; ♀, Kansas (♂ also described).
- floridanus* (Ashmead), 1887, p. 76; ♂, Florida (♀ also described).
- foveolatus* Ashmead, 1887, p. 76; ♀, Florida (Florida, Texas, and Arizona north to Saskatchewan and Ontario; Muesebeck and Walkley, 1951) (synonym: *hortorum* Brues, 1907b).
- gallicola* Fouts, 1942, p. 168; ♀, Oregon (also California).
- hubbardi* Howard, 1885, p. 217; ♀, Florida.
- longiceps* Kieffer, 1904a, p. 529; ♀, Texas.
- longinervis* Fouts, 1928, p. 131; ♀, Nebraska (♂ also described) (also South Dakota, California).
- megacephalus* Ashmead, 1893, p. 74; ♀, Florida.
- mellipes* (Ashmead), 1887, p. 76; ♀, Florida.
- occipitalis* Kieffer, 1906b, p. 252; ♀, Nevada (also California).
- platynotae* Ashmead, 1893, p. 75; ♂, Virginia (♀ also described) (widespread in U.S.) (synonym: *euliae* Fouts, 1926).
- politus* Ashmead, 1893, p. 75; ♀, Virginia.
- Mexico and Central America*
- brevicornis* Kieffer, 1904b, p. 382; ♀, Nicaragua.
- carinatus* Kieffer, 1905c, p. 10; ♀, Nicaragua.
- castaneus* Kieffer, 1905c, p. 11; ♀, Nicaragua.
- macrophthalma* Kieffer, 1906b, p. 252; ♀, Mexico.
- tepicensis* Ashmead, 1895a, p. 540; ♂, Mexico.
- West Indies*
- grandiceps* (Kieffer), 1908b, p. 19; ♀, Cuba.
- incompletus* Ashmead, 1894, p. 196; ♀, St. Vincent (also Grenada).

5. Genus BETHYLUS Latreille

- Bethylus* Latreille, 1802, p. 315 (type species *Omalus fuscicornis* Jurine, designated by Internat. Comm. Zool. Nomen., Opinion 153, 1944). —Kieffer, 1905b, pp. 253, 267-282 (European spp.; review of nomenclature to 1905). —Kieffer, 1908a, pp. 15-16. —Kieffer, 1914, pp. 507-515 (spp. of world). —Berland, 1928, pp. 99-101 (spp. of France).

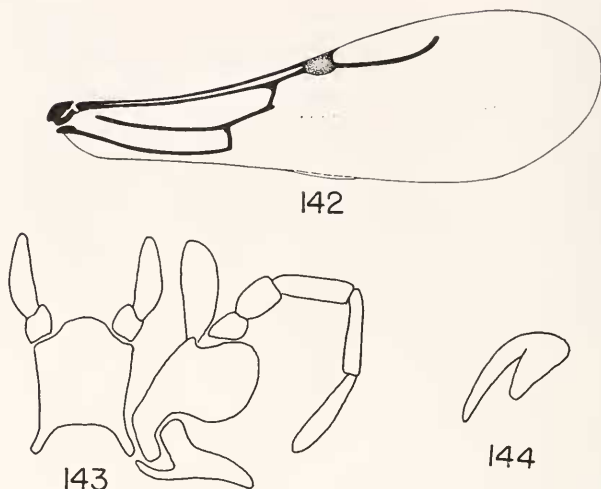
—Richards, 1939, pp. 305-319 (British spp.). —Evans, 1962a, pp. 1-12 (North American spp.).

Perisemus Foerster, 1856, p. 95 (type species *P. triareolatus* [= *fuscicornis* Jurine], monobasic). —Ashmead, 1893, pp. 69-72 (in part). —Ashmead, 1902, pp. 272-273. Synonymy by Kieffer, 1905b.

Episemus Thomson, 1862, p. 452 (type species *E. variabilis* Thomson [= *fuscicornis* Jurine], designated by Richards, 1939). Synonymy with *Perisemus* by Ashmead, 1893.

Digoniozus Kieffer, 1905b, p. 245 (type species *Perisemus oregonensis* Ashmead [= *decipiens* Provancher], monobasic). —Kieffer, 1914, p. 522. Synonymy by Evans, 1962a.

Generic characters.—Small wasps (under 5 mm in length), of dark coloration, wings often very short (in either sex) but tegulae present and thorax without reductions associated with flightlessness. Maxillary palpi with five segments, the basal segment very short; labial palpi with two segments; mandibles with four or five apical teeth, the most basal tooth broad and blunt; clypeus short, rounded or obtusely angulate apically, not strongly tectiform but with a median carina which is arched in profile and which continues up the lower front well above level of lower margins of eyes; antennae with twelve segments; eyes glabrous, situated close to base of mandibles but far removed from posterior margin of head. Mesoscutum short, notauli absent but parapsidal furrows present; scutellum with a transverse, slender basal groove which connects two very small, widely separated basal pits; propodeum margined laterally but without other carinae; front femora incrassate; tibiae without spines; claws strongly bent, deeply bifid. Fully winged forms with only three closed cells in the fore wing (costal, median, and submedian), marginal cell open apically and on the wing margin, radial vein turned up sharply at apex in most species; prostigma absent, but subcosta often slightly thickened beyond junction with basal vein; basal vein angular in such a way that the lower section appears as a continuation of median vein, giving rise to a short stub (base of cubitus) at the angulation; transverse median vein appearing to arise far basad of basal vein. Abdomen sessile, fusiform, slightly depressed. Male subgenital plate with a strong, U-shaped apical emargination (see fig. 3 in Evans, 1962a; fig. 102 in Richards, 1939). Male genitalia with the parameres completely divided into dorsal and ventral lobes; cuspis undivided, hirsute; aedoeagus simple (see fig. 103 in Richards, 1939). (Figs. 142-144.)



Bethylus decipiens (Provancher). Fig. 142. Fore wing, female. Fig. 143. Labium and maxilla, female. Fig. 144. Tarsal claw, female.

Remarks.—This genus has been treated in some detail by Richards (1939) and by myself (1962a), and further discussion seems unnecessary. Most of the species are polymorphic for wing length in both sexes; in the two North American species fully winged females are rare, and no fully winged males have yet been discovered.

Biology.—Richards (1939) has discussed the biology of the British species. The prey consists of caterpillars, chiefly of Microlepidoptera, which are stung and malaxated, then dragged to a place of concealment. Several eggs are laid on the prey and several larvae develop on a single host. The North American *B. amoenus* is reported to attack the olethreutid moth *Rhopobata naccana* and also the nitidulid beetle *Brachypterolus pulicarius*, although I am inclined to question the second record. Recently I have discovered a micropterous female *B. decipiens* from San Francisco, California [CIS], taken by J. Powell “grasping head of dead *Cnephasia* larva [Tortricidae] with mandibles.”

Distribution.—Holarctic; in North America occurring throughout much of Canada and Alaska, south to central California, Colorado, and New York.

Included species.—Only two species occur in North America: *amoenus* Fouts, 1928, p. 127; ♀, New York (Maine and

New York to Alberta and Northwest Territories; ♂ also described).

decipiens (Provancher), 1887, p. 179; ♀, Quebec (Nova Scotia to New York, west to California and to Alaska; ♂ also known) (synonyms: *oregonensis* (Ashmead), 1893, *californicus* (Bridwell), 1919, *brachypterus* Whittaker, 1929, *flavicornis* Whittaker, 1929).

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ALPHABETICAL LIST OF ABBREVIATIONS (OF STRUCTURES)
USED IN TEXT

DAO: diameter of anterior ocellus

HE: height of eye (maximum, lateral view)

LFW: length of fore wing

LH: length of head (apical margin of clypeus to median vertex crest)

LT: length of thorax (lateral view, excluding prothoracic collar but including propodeum)

OOL: ocello-ocular line (minimum distance from eye to lateral ocellus)

WF: width of front (measured at its minimum point)

WH: width of head (maximum, including eyes)

WOT: width of ocellar triangle (including lateral ocelli)

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